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PHYSICAL AND CHEMICAL PROPERTIES OF THE PETROLEUMS OF CALIFORNIA

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ENGINEERING

BY

IRVING C. ALLEN, WALTER A. JACOBS, A. S. CROSSFIELD AND R. R. MATTHEWS

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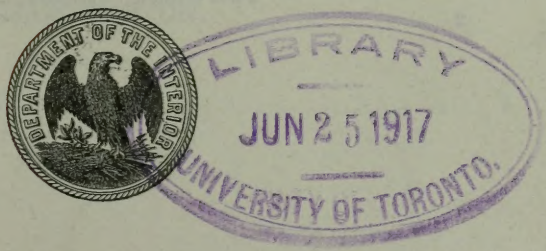

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PHYSICAL AND CHEMICAL PROPERTIES OF THE PETROLEUMS OF CALIFORNIA.

By Irving C. Allen, Walter A. Jacobs, A. S. Crossfield, and R. R. Matthews.

INTRODUCTION.

This report presents the results of work being done by the Bureau of Mines in continuation of its investigations of the petroleum resources of the United States with especial reference to the increase of safety and efficiency in the utilization of petroleum belonging to or for the use of the Government. The work reported herein deals with the chemical and physical properties, as usually determined, of the crude petroleums of the oil fields of California.[a]

Samples of petroleum from the following districts in the oil fields of the State were examined and analyzed:

Districts in which samples were collected.

District.	County.	District.	County.
Fullerton	Orange.	Sespe	Ventura.
Brea Canyon	Do.	Santa Paula	Do.
Los Angeles City	Los Angeles.	Adams Canyon	Do.
La Brea, Salt Lake, or Santa Fe (west of Los Angeles).	Do.	Wheeler Canyon	Do.
		Summerland	Santa Barbara.
		Santa Maria	Do.
Puente Hills	Do.	Lompoc	Do.
Whittier	Do.	Arroyo Grande	San Luis Obispo.
Coyote Hills	Do.	Coalinga	Fresno.
Newhall	Do.	Midway	Kern.
Piru	Ventura.	Sunset	Do.
Bardsdale	Do.		

[a] For additional data see Arnold, Ralph, and Anderson, Robert, Geology and oil resources of the Coalinga district, California, with a report on the chemical and physical properties of the oils by I. C. Allen: U. S. Geol. Survey Bull. 398, 1910, pp. 264–272; also Allen, I. C., and Jacobs, W. A., Physical and chemical properties of the petroleums of the San Joaquin Valley of California: Bull. 19, Bureau of Mines, 1912, 60 pp.

The methods of collecting samples and making analyses have been described in a previous publication[a] of the bureau. Briefly they were as follows:

COLLECTION AND EXAMINATION OF SAMPLES.

SAMPLING.[b]

The samples were collected at the wells by members of the Bureau of Mines. They were put in 1-gallon tin cans that were soldered tight and shipped at once to the laboratories where the analyses were made. The samples were taken, where possible, by allowing the oil to run from the outflow of the well directly into the sample can; where this method was impracticable a dipper was used. After the can was filled it was soldered tight as soon as possible, to avoid loss of the more volatile constituents of the sample by volatilization. Oil that had been exposed to atmospheric influences for even a short period was not collected. It was believed that collecting fresh oil, quickly sealing the can, and not opening the can until a part of the oil was taken for analysis insured the composition of the sample analyzed being identical with that of the oil that flowed from the well.

PHYSICAL AND CHEMICAL EXAMINATION.

SPECIFIC GRAVITY.

The specific gravity was determined by means of the Westphal balance.

The Baumé scale for indicating the density of petroleum (in the writers' opinion a most deplorable system and one to be discouraged) is in such common use that for the convenience of those unfamiliar with the specific gravity of oils both the Baumé degree[c] and the specific gravity are given in the accompanying tables (pp. 24 to 37).

FLASH POINT.

As most of the crude oils examined contained at least a trace of water, they showed a marked tendency to froth when heated and gave considerable difficulty with the closed Pensky-Martens[d] flash tester, many frothing over at temperatures much below the flash point of the oil. For this reason, and to obtain comparative tests, it was considered advisable to determine the flash points of all the crude samples in an open Pensky-Martens cup carefully screened from air

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[a] Allen, I. C., and Jacobs, W. A., Physical and chemical properties of the petroleums of the San Joaquin Valley of California: Bull. 19, Bureau of Mines, 1911.

[b] For detailed methods of sampling, see Allen, I. C., Specifications for the purchase of fuel oil for the Government, with directions for sampling oil and natural gas: Tech. Paper 3, Bureau of Mines, 1911, 13 pp.

[c] Standard, density and volumetric tables: U. S. Bureau of Standards Circular No. 19, Aug. 1, 1909, p. 18, Sept. 15, 1911.

[d] Benedikt-Ulzer, Analyse der Fette und Wachsarten, 1908, pp. 386–388. Redwood, Boverton, Petroleum and its products, vol. 2, 1906, pp. 593–594. Holde, Untersuchung der Mineralöle und Fette, 1909, p. 133.

currents. On account of the frothing of the samples the temperature had to be increased slowly; a rise of 2° to 3° C. per minute was found to give good results. The gas test flame, of the size and form recommended for the Abel tester,[a] was exposed for one second 1 cm. above the surface of the oil, at each rise of 1° C. beginning at 10° below the flash point as determined by a preliminary test.[b]

For accurate testing the Bureau of Mines flash testers which have been developed since these tests were begun are recommended.

BURNING POINT.

After the flash point had been determined, the heating was continued without interruption, exactly as before, until the "flash" became permanent, that is, until the oil ignited and continued to burn quietly.

VISCOSITY.

The viscosity was determined in an Engler[c] viscosimeter at 20° C.

CALORIFIC VALUE.

The calorific value was determined in a Berthelot combustion bomb.[d] (Dinsmore-Atwater model.)

The British thermal units per pound were calculated by multiplying the calories per gram by 1.8.

SULPHUR.[e]

Sulphur was determined by carefully washing out with distilled water the contents of the bomb after the combustion, the sulphuric acid being precipitated with barium chloride in the usual manner, and the percentage of sulphur calculated.[f]

WATER.[g]

Water was most accurately and most conveniently determined during the course of an ordinary fractionation; it distilled over in those fractions having a boiling point between 100° and 150° C. under

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[a] Redwood, Boverton, Petroleum and its products, vol. 2, 1906, pp. 566–567.

[b] Allen, I. C., and Crossfield, A. S., The flash point of oils, methods and apparatus for its determination: Tech. Paper 49, Bureau of Mines, 1913, pp. 17–21.

[c] Benedikt-Ulzer, Analyse der Fette und Wachsarten, 1908, pp. 58–61. Redwood, Boverton, Op. cit., pp. 602–603.

[d] Report on the operations of the coal testing plant of the United States Geological Survey at the Louisiana Purchase Exposition, St. Louis, Mo., 1904: U. S. Geol. Survey Prof. Paper 48, 1905, p. 179.

Bownocker, J. A., Lord, N. W., and Somermeier, E. E., Coal: Bull. Geol. Survey of Ohio, No. 9, 4th ser., 1908, pp. 320–324.

[e] For detailed methods for the determination of sulphur, see Allen, I. C. and Robertson, I. W., Methods of determining the sulphur content of fuels, especially petroleum products: Tech. Paper 26, Bureau of Mines, 1912.

[f] Allen, I. C., Relative values of fuels used on the Pacific coast: Min. and Sci. Press, Dec. 8, 1900, p. 569. Arnold, R., Anderson, R., and Allen, I. C., Geology and oil resources of the Coalinga oil district, California: U. S. Geol. Survey Bull. No. 398, 1910, p. 265.

[g] For detailed methods for the determination of water, see Allen, I. C., and Jacobs, W. A., Methods for the determination of water in petroleum and its products: Tech. Paper 25, Bureau of Mines, 1912.

atmospheric pressure and could be removed readily from the receivers with a micropipette and weighed. Usually a few drops of water adhered to the condenser and failed to run into the receivers; in this event a small pellet of absorbent cotton moistened with water, squeezed as dry as possible and weighed, was fastened to a wire and run up into the condenser to remove these last traces of water. The weight of the drops was determined by the increase in weight of the cotton pellet.

FRACTIONATION.

The fractionation, or separation of each oil into its crude commercial components, was made in an electrically heated still,[a] and was conducted as follows:

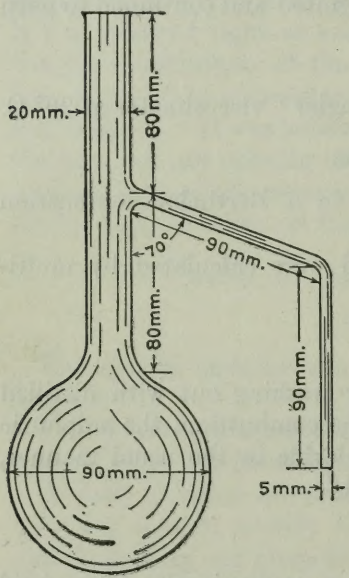

FIGURE 1.—Flask for distilling oil.

Two hundred grams of the sample of oil was weighed into a ¼-liter flask of the dimensions shown in figure 1. The flask was then connected to a Liebig condenser placed vertically, and the distillates were collected in weighed receiving tubes placed in a Bruehl receiver.

The oil was distilled under atmospheric pressure at increasing temperatures up to 325° C., the receivers being changed at each increment of 25°. The temperature was then allowed to drop to 125° C., to keep the oil from boiling over when the vacuum was used, and the distillation was again continued under a vacuum of 10 to 20 mm. mercury pressure[b] till the temperature within the flask reached 325° C.

These cuts at each increment of 25° C. are termed collectively the "fractional distillation" and are shown in the table on pages 12 to 23.

SEPARATION AND DETERMINATION OF PARAFFIN.

Existing methods for the determination of paraffin in crude oils, residues, and fluxes depend almost wholly on the relative solubilities in various solvents of the solid paraffins, the liquid paraffins and unsaturated bodies that occur in petroleum and its products. One of the

[a] For detailed description of the still and method of distillation, see Allen, I. C., and Jacobs, W. A., Physical and chemical properties of the petroleums of the San Joaquin Valley of California: Bull. 19, Bureau of Mines, 1911, pp. 29–33.

[b] A vacuum of 20 mm. pressure means that if the atmospheric pressure was, for example, 754 mm. and the manometer connected with the receiver indicated a pressure of 734 mm., then the actual pressure at which the oil was distilled was 754–734=20 mm.

oldest methods is that of Grotowsky, modified by Engler and Böhm,[a] which depends on the separation of paraffin by its insolubility in a mixture of ethyl alcohol and ether. This method has been improved by Holde [b] and is the one in most common use to-day. Zaloziecki [c] separates paraffin by crystallizing it from a mixture of ethyl and amyl alcohols. The method of Pawlewski and Filemonowicz [d] depends on the insolubility of paraffin in glacial acetic acid; that of Höland [e] on the insolubility of paraffin in absolute alcohol.

None of these methods is applicable to all mixtures containing paraffin. Efforts to improve these methods by previous treatment of the mixture with sulphuric acid or by distillation have not been entirely successful. In Holde's improved method the sample is first distilled down to a coke, and the paraffin is separated from an aliquot part of the distillate by crystallizing it from a mixture of ether and alcohol at a low temperature. If impure, the paraffin is treated with sulphuric acid or is recrystallized from absolute alcohol. This method, though the best one in use at present, gives inaccurate results. It is long and tedious; some paraffin is probably destroyed in the distillation, some is lost in the solutions, some heavy oils may be retained in the precipitate and the maintenance of temperatures as low as $-20°$ C. is attended with difficulties.

Efforts have been made in the Bureau of Mines laboratories to improve these methods, but up to the present time no method of universal application has been found. The following method, still incomplete in detail, is suggested as being of use in some cases:

The sample to be treated is dissolved in petroleum ether, filtered, and the filtrate treated first with concentrated sulphuric acid and then with fuming sulphuric acid. The petroleum ether is then distilled off and the residue dissolved in acetic ether. Ninety-five per cent alcohol is added and the mixture cooled to 0° C. in ice. The separated paraffin is filtered off, washed with 75 per cent alcohol, dried, and weighed. Under the above conditions 2.5 mg. of paraffin (melting point 56° to 58° C.) will dissolve in 100 c. c. of the solvent mixture.

Application of the above method to mixtures of Trinidad refined asphalt, which showed only a trace of a solid white substance resembling paraffin, and of paraffin having a melting point

[a] Engler, C., and Böhm, M., Zur quantitative Bestimmung des Paraffins: Dingler's Polytech. Jour., vol. 262, 1886, p. 473.

[b] Holde, D., Determination of paraffin in high boiling distillates from petroleum: Jour. Soc. Chem. Ind., vol. 16, 1897, p. 362.

[c] Zaloziecki, R., Über die quantitative Bestimmung des Paraffins: Dingler's Polytech. Jour., vol. 267, 1888, p. 274.

[d] Pawlewski, B., and Filemonowicz, J., Über die Löslichkeit und Bestimmung von Paraffin: Ber. Deutsch. Chem. Gesell., vol. 21, 1888, p. 2973.

[e] Höland, R., Über Paraffinbestimmungen: Chem. Zeitung vol. 17, 1893 p. 1473.

of 56° to 58° C., gave the following results, after correction for solubility:

Results of tests to separate paraffin from Trinidad refined asphalt.

Weight of asphalt.	Weight of paraffin.	Calculated paraffin content in mixture.	Paraffin recovered from mixture.
Grams.	*Grams.*	*Per cent.*	*Per cent.*
5.0260	0.1606	3.09	3.08
5.1358	.1578	2.98	2.92
5.0575	.5242	9.39	9.30
----------	.1350	100.00	100.00
5.0707	.2556	4.99	5.18

REFINING.

The oils—naphthas, lamp oils, and lubricants—were further refined as follows: Two hundred and fifty grams of the oil was put in a 1-liter separatory funnel and shaken vigorously; that is, 120 to 150 shakes per minute for 15 minutes in a shaking machine,[a] as follows:

Four times with 10 c. c. of concentrated sulphuric acid (or until the oil was not appreciably colored by this acid treatment), once with a 10 per cent solution of sodium carbonate to remove the free acids, and three or four times with water to remove the last traces of soda, etc. The oil was then dried with Glauber salts and distilled.

This refining acid treatment yielded a water-white, practically odorless product of excellent quality.

Because of their high viscosity, it is advisable to dilute the heavier fractions (those distilled under a vacuum at temperatures above 250° C.) with 1 part of chemically pure benzene before subjecting them to the acid treatment.

Unrefined naphthas.—Those fractions that boil at temperatures up to 150° C., under atmospheric pressure, comprise the "unrefined naphthas."

Unrefined lamp oils.—Those fractions boiling between 150° and 300° C., under atmospheric pressure, comprise the "unrefined lamp oils."

Unrefined lubricants.—Those fractions boiling between 300° C., under atmospheric pressure, and 325° C., under a vacuum of 10 to 20 mm. mercury pressure, comprise the "unrefined lubricants."

Asphaltum residue.—That part remaining in the flask, undistilled, is termed "asphaltum residue."

In practically all of the oils examined this residue was a jet-black, lustrous mass, that was brittle at room temperatures and had a consistency much like ordinary taffy. It could be chewed, but was very sticky when slightly warmed; on solution in benzene it left

[a] Eimer & Amend, catalogue of chemical apparatus, shaking apparatus No. 4591.

no appreciable quantity of carbon flecks. This showed that these asphaltum petroleums, after removal of the oils distillable at temperatures up to 325° C., under a pressure of 10 to 20 mm. of mercury, leave a residue of solid elastic asphaltum usable for commercial purposes.

Refining losses.—The above acid treatment causes a total loss of approximately 11 per cent in the oil treated. This loss is too high, and should be reduced.

RESULTS OF EXAMINATION.

The statistical tables that follow show in detail the results of the examination of these oils. In the columns under the headings "Naphtha," "Lamp oils," "Lubricants," "Asphaltums," "Refined naphthas," "Refined lamp oils," and "Refined lubricants" the results are summarized in order to give an idea of the economically important constituents found in these oils. These "cuts" are necessarily arbitrary and can not be interpreted as synonymous with refinery cuts which themselves are varied from time to time, principally according to market demands.

FRACTIONAL DISTILLATION.

LOS ANGELES CITY DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.								Pressure of mercury.	Lubricants.								Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.		150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
166	Horton & Curtis	2	762	Tr.	.....	.....	.....	.....	.....	.....	.....	5.3	5.3	8.7	20	.....	0.5	7.5	6.6	8.8	6.4	11.8	50.3	44.0	0.4
167	C. C. Harris	4,5	768	Tr.	.....	.....	.....	.....	.....	.....	.....	1.8	1.8	11.2	20	.....	.....	3.1	6.2	6.4	7.5	11.2	45.6	52.1	.5
168	.....do	19, 20	767	Tr.	.....	.....	.....	.....	.....	.....	0.6	5.0	5.6	9.7	18	.....	.....	5.2	6.5	7.9	7.6	11.6	48.5	45.6	.3
169	Giegerich	1, 5, 22	768	0.5	.....	.....	.....	.....	.....	.....	.....	5.0	5.0	8.5	18	.....	.....	3.3	5.9	8.8	7.7	10.2	44.4	49.3	.8
170	Doran, Brown & Price	2,3	765	2.5	.....	.....	.....	.....	.....	.....	.....	4.7	4.7	9.0	25	.....	.6	6.6	6.8	6.9	6.7	10.6	47.2	44.8	.8
171	Tyler	7	770	2.0	.....	.....	.....	.....	.....	.....	.....	6.2	6.2	9.9	20	.....	.....	3.8	7.2	6.3	7.5	8.3	43.0	48.0	.8
172	.....do	1, 2, 3, 4	758	Tr.	.....	.....	.....	.....	.....	.....	.....	2.5	2.5	8.2	20	.....	1.9	6.8	7.6	7.9	6.8	10.5	49.7	47.4	.4
173	C. C. Harris	11, 12	757	.3	.....	.....	.....	.....	.....	.....	.....	4.3	4.3	9.6	20	.....	.....	3.8	6.2	7.7	8.3	10.3	45.9	49.1	.4
174	.....do	14, 25	760	7.2	.....	.....	.....	.....	.....	.....	.....	1.4	1.4	5.9	20	.....	.....	1.7	4.5	5.4	6.6	11.7	35.8	54.7	.9
175	Daggert & Fletcher	1, 3, 4, 5, 6, 8, 9, 10, 12	762	10.5	.....	.....	.....	.....	.....	.....	.....	.7	.7	6.0	20	.....	.....	3.9	8.2	7.6	6.5	12.6	44.8	42.9	1.1
176	Palin	14-19	760	2.2	.....	.....	.....	.....	.....	.....	.....	4.3	4.3	10.5	21	.....	.....	6.0	6.6	9.1	8.9	6.5	47.6	45.3	.6
177	Davis & Harrison	4	764	.3	.....	.....	.....	.....	.....	.....	.....	4.6	4.6	10.2	19	.....	.8	5.2	6.9	7.2	8.1	10.0	48.4	46.2	.5
178	C. C. Harris	18 or 2	763	Tr.	.....	.....	.....	.....	.....	.....	.....	3.7	3.7	10.0	18	.....	3.3	5.6	8.1	8.5	7.1	9.7	52.3	43.6	.4
179	E. A. Clampitt	6	765	.2	.....	.....	.....	.....	.....	.....	.....	8.4	8.4	9.4	21	.....	.....	1.8	4.2	5.7	6.1	8.0	35.2	55.4	.8
180	.....do	22	768	.1	.....	.....	.....	.....	.....	.....	.....	5.2	5.2	8.0	20	.....	3.2	4.8	6.7	7.3	6.6	8.9	45.5	48.5	.7
181	Los Angeles R. R	4	764	.2	.....	.....	.....	.....	.....	.....	.....	4.1	4.1	7.2	20	.....	.....	.....	2.8	4.2	5.3	6.6	26.1	69.1	.5
182	Richard Green	12-15	758	Tr.	.....	.....	.....	.....	.....	.....	.8	5.9	6.7	9.0	20	.....	2.2	4.3	7.7	7.5	8.3	10.2	49.2	43.8	.3
183	I. W. Shirley	5, 13, 19	762	.3	.....	.....	.....	.....	.....	.....	.....	6.2	6.2	9.2	21	.....	3.0	3.6	5.6	7.1	7.4	10.4	46.3	46.4	.8
184	Whittier Consolidated	6	763	.Tr.	.....	.....	.....	.....	.....	.....	.....	5.7	5.7	9.0	20	.....	.....	1.7	4.5	4.8	5.8	7.7	33.5	60.2	.6
185	McCray	5, 2, 3, 1, 2, 7, 10, 11, 12, 13	754	.3	.....	.....	.....	.....	.....	.....	2.2	7.2	9.4	7.4	20	.....	.....	5.8	6.2	6.6	8.6	11.2	45.8	43.9	.6
186	Koford	7,8	756	Tr.	.....	.....	.....	.....	.....	.....	2.4	4.8	7.2	8.6	20	.....	1.0	5.7	6.0	8.2	7.3	12.0	48.8	43.5	.5
187	Woolner	21-27	760	11.2	.....	.....	.....	.....	.....	.....	.....	3.4	3.4	7.2	20	.....	.....	5.2	6.8	5.6	6.8	8.9	40.5	43.8	1.1
	Average (22 samples)	.....	762	1.7	.....	.....	.....	.....	.....	.....	.3	4.5	4.8	8.7	20	.....	.8	4.3	6.3	7.1	7.2	9.9	44.3	48.6	.6

LA BREA, SALT LAKE, OR SANTA FE DISTRICT (WEST OF LOS ANGELES).

188	Hancock Ranch	139	766	0.1	.....	.....	0.3	0.5	0.8	2.9	5.0	4.4	13.9	5.0	21	.....	.....	4.9	4.0	3.7	5.7	7.6	30.9	54.2	0.9
189	.....do	6	767	Tr.	.....	.....	.2	1.9	4.3	3.6	5.1	4.0	19.1	5.0	21	.....	.....	2.4	3.7	5.2	4.5	8.9	29.7	49.8	1.4
190	.....do	37	766	Tr.	.....	.....	1.8	2.7	3.7	3.7	4.6	4.1	20.6	6.2	22	.....	0.4	3.7	3.2	4.8	4.9	7.6	30.8	47.2	1.4
191	.....do	49	768	Tr.	.....	.....	.....	.2	3.6	5.2	5.0	5.9	19.9	5.7	20	.....	2.3	4.8	4.7	6.6	4.4	8.3	36.8	43.0	.3
192	.....do	3	769	Tr.	.....	.....	.....	.9	2.1	3.3	3.3	4.0	13.6	4.9	22	.....	.....	2.7	3.5	4.3	5.5	8.2	29.1	56.5	.8
193	.....do	11	768	Tr.	.....	.....	.....	1.0	1.6	2.7	3.2	3.5	12.0	5.1	22	.....	2.0	3.2	4.1	4.2	4.4	8.7	31.7	55.3	1.0
194	Union (Pitcher & Garbutt)	3	768	Tr.	.....	.....	.....	1.6	4.5	5.6	4.8	6.4	22.9	6.4	20	.....	.....	4.2	4.5	5.9	6.1	8.3	35.4	40.5	1.2
195	.....do	4	768	Tr.	.....	.....	.....	.....	1.0	5.0	8.4	6.1	20.5	7.3	21	.....	1.9	3.8	4.7	6.3	7.0	10.0	41.0	38.4	.1
196	Gilmore	5	765	.8	.....	.....	.....	1.3	2.2	3.3	3.5	3.8	14.1	4.5	20	.....	.....	2.3	3.3	4.3	6.0	8.8	29.2	55.0	.9
197	Pacific Light & Power Co	3	764	Tr.	.....	.....	.....	1.5	2.8	3.4	3.5	4.4	15.6	5.2	20	.....	2.7	3.0	3.1	4.3	5.7	7.5	31.5	52.0	.9
198	.....do	9	764	1.5	.....	.....	.....	.....	2.0	3.2	3.5	4.1	12.8	5.9	21	.....	.....	2.3	4.0	4.1	5.6	10.1	32.0	52.9	.8
199	Clark	1-15	763	.3	.....	.....	.....	.....	1.8	1.2	3.2	3.8	10.0	6.1	20	.....	.....	2.5	2.8	5.0	6.6	10.8	33.8	54.9	1.0
200	Rancho La Brea	3	763	10.3	.....	.....	.....	.....	.....	.....	.....	3.8	3.8	3.9	20	.....	.....	1.6	3.1	3.8	4.8	6.6	23.8	60.7	1.4
201	.....do	7,8	753	Tr.	.....	.....	.5	.7	1.3	2.1	2.9	3.4	10.9	4.8	20	.....	.....	1.3	3.4	5.1	4.3	7.7	26.6	61.6	.9
202	Salt Lake (Hancock)	200	763	1.8	.....	.....	.....	.....	.3	.7	1.3	2.0	4.3	3.9	20	.....	.....	3.2	4.3	4.2	6.7	10.7	33.0	59.6	1.3
203	.....do	324	760	Tr.	.....	.....	.1	.3	.7	1.9	2.4	3.7	9.1	5.7	20	.....	.....	.4	3.7	4.1	5.0	8.0	26.9	63.1	.9
204	.....do	346,347,349	760	Tr.	.....	.....	.....	.5	1.0	1.6	2.4	3.6	9.1	4.7	21	.....	.1	2.7	3.9	3.8	4.7	8.7	28.6	61.7	.6
	Average (17 samples)	.....	764	.9	.....	.....	.2	.8	2.0	2.9	3.7	4.1	13.7	5.3	21	.....	.6	2.9	3.8	4.7	5.4	8.5	31.2	53.3	.9

FULLERTON DISTRICT.

205	Columbia	17	764	Tr.	0.5	0.5	10.4	7.9	6.3	5.6	5.2	6.8	42.2	6.4	20	.....	.....	1.2	3.2	3.7	4.1	6.7	25.3	31.2	0.8
206	.....do	22	765	Tr.	.2	.2	7.3	8.6	7.9	6.2	5.7	6.0	41.7	7.0	21	.....	1.2	3.3	3.0	2.8	2.6	3.7	23.6	33.2	1.3
207	Fullerton	2	763	Tr.	1.8	1.8	7.9	9.0	8.9	6.3	6.4	6.3	41.8	6.9	21	.....	.....	1.0	3.1	2.9	4.3	7.5	25.7	25.7	2.0
208	Santa Fe	1	764	Tr.	.....	.....	.....	1.8	3.9	4.8	5.0	3.9	19.4	6.5	20	.....	.....	4.4	5.2	6.2	6.8	9.7	38.8	40.9	.9
209	.....do	24	764	Tr.	.....	.....	.4	1.8	2.6	4.0	5.0	4.7	18.5	6.1	20	.....	.....	4.1	4.4	5.7	5.8	7.9	34.0	45.7	1.8
210	.....do	26	763	Tr.	.....	.....	.2	1.0	2.6	4.6	4.7	4.7	17.8	5.9	19	.....	2.0	3.7	4.8	5.2	6.3	7.9	35.8	45.4	1.0
211	.....do	49	762	Tr.	.2	.2	1.0	3.3	4.0	4.0	3.7	5.3	21.3	6.3	20	.....	.4	3.2	5.2	4.7	6.4	8.7	34.9	42.3	1.3
212	.....do	42	762	Tr.	.1	.1	.9	2.5	3.8	4.8	4.5	4.3	20.8	5.1	20	.....	1.8	2.8	4.4	5.2	6.6	8.2	34.1	43.1	1.9
213	Fullerton Consolidated	16	763	Tr.	.....	.....	.....	.....	.2	.9	2.5	3.5	7.1	7.8	20	.....	1.1	4.2	5.3	6.4	7.5	11.1	43.4	48.8	.7
214	Union	33	764	2.5	.....	.....	.....	.....	.....	.....	.....	2.3	2.3	7.2	22	.....	.....	.....	6.1	6.9	7.1	10.0	37.3	56.2	1.7
215	.....do	35	763	Tr.	.....	.....	.....	.2	.9	2.1	5.1	5.0	13.3	7.3	20	.....	.....	.9	6.1	5.0	6.2	9.1	34.6	51.0	1.1
	Average (11 samples)	.....	763	.2	.3	.3	2.6	3.3	3.7	3.9	4.3	4.9	22.7	6.6	20	.....	.6	2.6	4.6	5.0	5.8	8.2	33.4	42.1	1.3

FRACTIONAL DISTILLATION—Continued.

BREA CANYON DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.								Pressure of mercury.	Lubricants.								Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.		150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
217	Union	28	764	Tr.	.....	.....	0.6	2.1	4.2	5.3	5.3	4.4	21.9	5.8	20	.....	.....	2.2	4.9	7.7	6.4	9.7	36.7	40.3	1.1
218	.....do	15	762	Tr.	.....	.....	.4	3.7	3.0	3.8	3.0	5.2	19.1	6.2	19	.....	.....	4.3	3.7	5.4	6.2	9.5	35.3	45.1	.5
219	.....do	21	761	Tr.	0.5	0.5	3.3	5.6	5.4	4.7	4.3	5.7	29.0	6.3	19	.....	0.9	3.4	4.0	4.4	6.4	10.2	35.6	33.8	1.1
220	Brea Canyon	7,1	759	Tr.	.....	.....	1.7	5.0	6.3	6.2	6.0	4.5	29.7	5.4	19	.....	.....	3.1	4.1	5.6	6.0	7.6	31.8	37.1	1.4
221	.....do	8	759	Tr.	.1	.1	1.2	3.8	5.5	5.4	5.3	4.9	26.1	6.2	19	.....	.....	2.8	4.7	4.7	6.1	10.9	35.4	37.2	1.2
222	.....do	12	761	Tr.	.....	.....	3.4	5.7	5.1	4.7	5.7	4.7	29.3	5.4	19	.....	.9	2.7	3.8	4.7	5.7	8.1	31.3	37.9	1.5
223	.....do	18	760	Tr.	.....	.....	.....	.....	.5	2.6	5.2	6.0	14.3	6.4	20	.....	.....	3.6	4.9	5.2	6.3	9.4	35.8	49.3	.6
224	.....do	19	761	Tr.	.7	.7	2.7	4.5	4.5	5.0	4.5	5.2	26.4	5.5	19	.....	.....	3.7	4.2	4.7	5.5	8.5	32.1	38.9	1.9
225	Menges	2	765	Tr.	.....	.....	.4	1.7	5.5	4.6	4.7	5.1	22.0	6.5	19	.....	.....	3.6	4.1	5.3	6.1	9.8	35.4	41.3	1.3
	Average (9 samples)		761	Tr.	.1	.1	1.5	3.6	4.4	4.7	4.9	5.1	24.2	6.0	19	.....	.2	3.3	4.3	5.3	6.1	9.2	34.4	40.1	1.2

PUENTE HILLS DISTRICT.

226	Puente	52	760	Tr.	0.1	0.1	2.9	7.7	5.5	6.5	5.9	5.5	34.0	6.8	19	.....	.....	3.1	5.2	5.4	5.5	4.3	30.3	35.0	0.6
227	.....do	21	760	Tr.	2.4	2.4	5.1	5.8	6.1	6.2	5.6	6.5	35.3	7.4	20	.....	.....	4.5	5.1	5.2	5.4	5.9	33.5	27.2	1.6
228	.....do	45	761	Tr.	.6	.6	2.7	6.1	8.6	7.4	4.9	4.5	34.2	7.0	22	.....	.....	3.8	4.4	5.0	5.2	7.7	33.1	30.3	1.8
229	.....do	26	761	Tr.	.....	.....	.....	3.2	6.5	6.4	6.0	7.0	29.1	6.8	22	.....	.....	5.2	5.8	5.2	6.8	7.5	37.3	32.8	.8
230	.....do	32	763	Tr.	.....	.....	5.5	8.5	7.8	4.3	5.4	6.2	37.7	6.7	21	.....	.....	4.2	4.6	4.9	5.5	8.3	34.2	27.3	.8
231	.....do	60	761	Tr.	.9	.9	4.8	5.9	5.6	5.7	5.2	5.5	32.7	5.2	21	.....	0.6	3.3	3.6	5.0	5.4	6.8	29.9	35.2	1.3
232	.....do	70	760	Tr.	1.0	1.0	6.7	6.5	5.9	5.0	4.9	5.4	34.4	7.2	20	.....	.....	3.5	4.5	4.4	5.5	6.6	31.7	31.5	1.4
233	.....do	4	761	Tr.	2.4	2.4	7.9	7.8	6.1	4.1	4.5	4.4	34.8	5.9	21	.....	.....	3.5	3.0	4.3	4.9	8.0	29.6	31.7	1.5
234	.....do	16	761	Tr.	.....	.....	1.3	7.1	7.2	7.0	4.8	4.0	31.4	5.1	20	.....	.....	3.4	3.2	3.6	5.5	7.3	28.1	39.8	.7
	Average (9 samples)		761	Tr.	.8	.8	4.1	6.5	6.7	5.8	5.2	5.4	33.7	6.5	21	.....	.1	3.8	4.4	4.8	5.5	6.9	32.0	32.3	1.2

WHITTIER DISTRICT.

235	Murphy	21	761	Tr.	.....	.....	.....	.....	6.1	6.4	5.6	5.0	23.1	8.1	21	.....	1.9	3.8	4.6	6.2	7.4	9.4	41.4	35.1	0.4
236	.....do	5	759	Tr.	.....	.....	.....	.....	4.7	5.6	7.2	5.6	23.1	7.4	21	.....	.....	4.3	5.3	6.0	7.8	9.6	40.4	35.6	.9
237	.....do	8	763	Tr.	.....	.....	.....	0.2	3.1	7.5	5.2	7.4	23.4	7.5	21	.....	.....	3.8	4.2	6.5	7.9	9.9	39.8	36.4	.4
238	.....do	14	762	Tr.	.....	.....	.....	.....	.5	2.7	5.8	6.0	15.0	7.4	21	.....	.....	6.5	5.8	6.2	7.7	10.1	43.7	40.9	.4
239	Central	50	764	Tr.	.....	.....	.....	.2	2.1	5.5	5.7	7.4	20.9	6.7	21	.....	.....	3.5	4.5	5.8	7.9	9.3	37.7	40.6	.8
240	.....do	1	765	Tr.	.....	.....	.....	.....	.....	.....	1.6	7.6	9.2	9.8	21	.....	1.7	4.8	5.6	6.3	7.0	10.1	45.3	45.1	.4
241	.....do	4	761	Tr.	.....	.....	.....	.....	.....	.....	3.3	5.5	8.8	9.7	20	.....	.....	4.3	5.7	7.4	7.6	11.2	45.9	45.0	.3
242	.....do	8	760	Tr.	0.2	0.2	2.7	7.3	6.8	4.3	5.3	5.3	31.7	6.7	20	.....	.....	3.9	4.0	6.0	6.2	8.1	34.9	31.9	1.3
243	.....do	2	760	Tr.	.....	.....	.....	.....	.....	.3	2.3	6.9	9.5	8.2	20	.....	.....	5.5	6.0	6.2	6.4	10.0	42.3	47.9	.3
244	Fidelity	4	761	Tr.	.....	.....	.....	.....	2.1	5.0	6.1	7.0	20.2	7.0	20	.....	.....	3.3	6.0	6.2	7.6	9.2	39.3	39.8	.7
245	.....do	5	759	Tr.	.....	.....	.....	1.0	3.3	5.0	6.0	5.6	20.9	6.9	20	.....	.....	4.4	4.8	6.5	6.7	9.0	38.3	40.2	.6
246	Turner	6	762	Tr.	.....	.....	.....	.....	.3	3.5	6.6	7.6	18.0	7.9	20	.....	.....	3.4	6.2	5.9	7.1	12.3	42.8	38.8	.4
247	.....do	8	761	Tr.	.....	.....	.....	.....	.....	.4	2.2	6.3	8.9	7.0	20	.....	1.5	5.3	6.7	7.8	7.3	9.9	45.5	44.9	.7
248	Home	6	760	Tr.	.....	.....	.....	.....	.4	3.8	7.4	7.9	19.5	8.8	20	.....	.....	5.2	5.9	6.7	7.5	10.1	44.2	35.9	.4
249	.....do	18	763	0.3	.....	.....	.....	.....	.4	.6	3.0	6.1	10.1	10.0	20	.....	.5	5.1	5.7	6.4	7.5	10.3	45.5	43.6	.5
250	.....do	14	763	Tr.	.....	.....	.....	.....	2.8	7.1	7.7	6.5	24.1	7.9	20	.....	.....	5.0	6.5	6.3	7.3	9.7	42.7	32.2	1.0
251	Whittier Crude	8	758	Tr.	.....	.....	.....	3.4	6.2	5.2	4.3	5.6	24.7	6.9	20	.....	1.1	4.4	5.5	5.0	5.8	8.0	36.7	37.7	.9
252	.....do	10	761	Tr.	.....	.....	.....	.....	.....	.7	5.5	6.5	12.7	8.8	19	.....	.4	4.8	6.7	7.8	6.8	10.5	45.8	40.9	.6
	Average (18 samples)	.....	761	Tr.	.0	.0	.2	.7	2.2	3.5	5.0	6.4	18.0	7.9	20	.....	.4	4.5	.5	6.4	7.2	9.9	41.8	39.6	.6

COYOTE HILLS DISTRICT.

253	Murphy	1	745	Tr.	.....	.....	.....	0.2	0.7	3.6	5.6	5.8	15.9	6.0	16	.....	1.6	5.0	5.2	5.3	5.5	6.8	35.4	47.8	0.9
254	.....do	2	754	Tr.	.....	.....	.....	1.5	3.9	5.2	5.6	6.1	22.3	6.4	16	.....	4.0	4.3	4.8	5.0	5.2	6.8	36.5	40.2	1.0
	Average (2 samples)	.....	750	Tr.	.....	.....	.....	.8	2.3	4.4	5.6	6.0	19.1	6.2	16	.....	2.8	4.6	5.0	5.2	5.4	6.7	35.9	44.0	.9

NEWHALL DISTRICT.

255	Elsmire (Union)	2	748	Tr.	.....	.....	.....	.....	.....	.....	0.7	5.7	6.4	7.8	16	.....	4.6	6.0	6.5	6.9	7.2	8.1	47.1	46.2	0.3
256	.....do	20	746	0.2	.....	.....	.....	.....	.....	.....	.5	2.3	2.8	7.4	20	.....	3.1	4.6	5.7	6.3	6.9	8.0	42.0	54.6	.4
257	Alpine (Santa Ana)	1	748	.7	.....	.....	.....	.....	.....	.....	2.2	2.2	6.9	18	.....	4.4	4.4	5.3	6.2	8.0	9.7	44.9	50.1	2.1
258	Santa Ana	3	745	1.3	.....	.....	.....	.....	.....	.....	.....	.3	.3	4.4	20	.....	4.6	5.2	6.0	6.9	7.7	8.5	43.3	54.8	.3
259	Zenith	2,1	749	Tr.	.....	.....	.....	.....	.....	.....	0.6	4.5	6.1	11.2	8.4	20	.....	2.9	2.6	4.9	5.3	6.0	8.6	38.7	49.6	.5
260	Kellerman	.....	744	Tr.	.....	.....	.....	.....	.....	.....	2.5	5.6	6.9	15.0	8.7	15	.....	4.0	4.6	5.1	5.7	6.5	8.9	43.5	41.0	.5
261	J. G. Evans (New Century)	1	748	Tr.	.....	.....	.....	27.4	25.7	22.7	11.0	6.3	93.1	4.6	.....	.....	.....	.....	.....	.....	.....	.....	4.6	1.9	.4
262	Wiley	6	748	Tr.	0.1	0.1	0.9	3.3	8.5	7.3	8.0	8.7	36.7	7.5	10	.....	2.2	3.9	4.8	5.6	5.9	7.8	37.7	24.3	1.2
263	C. S. O. W	1, 2, 4, 5, 6, 7, 12, 13, 15, 18, 19, 21, 22, 23, 24, 25, 27, 28, 29, and Star	749	Tr.	.9	.9	3.6	9.8	10.0	9.4	6.8	9.7	49.3	8.3	9	.....	2.5	3.9	4.7	5.2	4.9	6.1	35.6	12.4	1.8
	Average (9 samples)	.....	747	.2	.1	.1	.5	4.5	4.9	4.7	4.1	5.4	24.1	7.1	14	.....	3.1	3.9	4.8	5.3	5.9	7.4	37.5	37.3	.8

FRACTIONAL DISTILLATION—Continued.

PIRU DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.								Pressure of mercury.	Lubricants.								Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.		150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
264	Union	13, 14, 15, 16, 17, 18	755	Tr.	1.5	1.5	1.6	4.1	4.3	4.5	3.1	5.0	22.6	5.9	25	.....	1.3	3.8	3.1	4.0	4.0	7.4	29.5	46.2	0.2
265	Union Oil Co	56	744	Tr.	.3	.3	1.2	1.6	3.8	5.8	6.0	6.2	24.6	7.4	18	.....	2.9	4.1	4.3	4.5	7.2	9.2	39.6	35.1	.4
266	.....do	33	739	Tr.	.1	.1	1.1	3.2	4.7	5.3	6.5	6.6	27.4	7.0	15	0.5	1.9	3.8	3.9	4.0	4.6	5.6	31.3	41.0	.2
267	.....do	21	754	Tr.	.3	.3	1.2	3.5	6.2	6.0	7.0	7.2	31.1	7.2	14	.5	3.9	4.0	4.0	4.5	6.0	9.3	39.4	28.3	.9
268	.....do	58	744	Tr.	1.5	1.5	2.9	4.8	4.9	5.0	5.1	5.2	27.9	5.9	18	.8	2.5	3.2	4.2	4.9	5.5	6.5	33.5	36.5	.6
269	.....do	15	731	Tr.	.8	.8	1.8	3.8	4.8	5.9	5.9	6.0	28.2	7.0	18	.....	.4	2.6	2.6	4.9	5.1	6.3	28.9	40.6	1.5
270	.....do	29	731	Tr.	.1	.1	.4	1.7	3.8	5.8	5.8	7.3	24.8	7.7	18	.3	2.6	3.8	4.5	5.4	6.1	8.5	38.9	36.1	.1
271	.....do	24	750	Tr.	.....	.....	.4	3.2	4.7	5.7	8.4	9.1	31.5	8.1	17	.....	.1	2.5	4.6	5.4	5.1	6.5	32.3	35.7	.5
272	Modella	1, 4, 5, 6, 12, 16, 17, 24	747	Tr.	.4	.4	4.3	7.2	7.7	7.2	6.0	5.8	38.2	5.7	15	.....	3.6	3.9	4.4	4.8	5.7	7.9	36.0	24.9	.5
273	.....do	7, 19, 21, 22, 28, 29	749	Tr.	.5	.5	5.0	7.0	7.2	7.3	5.7	6.3	38.5	6.6	15	.....	2.3	4.8	3.8	4.8	4.9	7.3	34.5	26.0	.5
274	Sunset	2, 4, 6, 7, 9	743	0.3	.....	.....	.....	.....	.....	.....	.....	.8	.8	9.3	16	.3	3.6	4.9	6.0	4.7	5.8	6.7	41.3	57.2	.4
275	Harris	1, 2	742	1.5	.....	.....	.....	.....	.....	.....	.....	.1	.1	1.2	14	4.0	6.2	6.2	7.2	7.9	9.5	9.8	52.0	45.7	.7
276	Fortuna	3, 4, 5, 6, 8, 14, 16, 18	751	.2	.....	.....	.....	.....	.....	.....	.....	.3	.3	11.0	17	.1	3.7	4.9	7.2	8.0	11.2	13.4	59.5	38.8	1.2
	Average (13 samples)	.....	745	.2	.4	.4	1.5	3.1	4.0	4.5	4.6	5.1	22.8	6.9	17	.5	2.7	4.0	4.6	5.2	6.2	8.1	38.2	37.8	.6

BARDSDALE DISTRICT.

277	Bronson	1	736	Tr	2.5	2.5	3.4	4.4	5.0	5.1	4.1	4.2	26.2	5.8	13	0.3	3.0	3.5	4.2	4.7	5.2	9.7	36.4	34.3	0.6
278	Robertson	7	744	Tr.	1.0	1.0	1.8	4.1	4.2	4.3	5.0	5.1	24.5	6.1	18	.....	3.3	3.1	3.7	5.9	6.7	8.4	37.2	36.5	.8
279	.....do	2, 12, 13	745	Tr.	2.4	2.4	2.3	2.8	3.1	5.2	5.6	5.6	24.6	6.1	15	.....	2.1	3.5	3.9	4.5	5.2	7.5	32.8	39.3	.9
280	Bookhart	3	742	10.1	a4.3	4.3	.....	.....	.....	.....	3.4	4.2	7.6	5.3	12	1.7	2.6	3.3	3.3	3.8	5.1	7.9	33.0	43.9	1.1
281	.....do	5	748	Tr.	.5	.5	1.1	2.7	3.4	3.3	4.5	4.6	19.6	6.6	13	.....	2.8	2.8	4.1	4.6	4.7	6.7	32.3	47.2	.4
282	.....do	6	741	14.9	.....	.....	.....	.....	.....	.....	.6	2.0	2.6	13.2	15	.....	1.1	2.4	3.8	3.9	4.5	7.8	36.7	45.2	.6
	Average (6 samples)	.....	743	4.2	1.8	1.8	1.4	2.3	2.6	3.0	3.9	4.3	17.5	7.2	14	.3	2.5	3.1	3.8	4.6	5.2	8.0	34.7	41.1	.7

SESPE DISTRICT.

283	My Dream		744	.....	0.9	0.9	1.0	1.1	3.1	4.1	7.2	7.0	23.5	8.1	14	.....	2.3	3.2	5.2	5.7	5.7	6.4	36.6	38.3	0.7
284	Kentuck	7 wells.	753	0.2	1.4	1.4	1.8	4.3	4.5	4.6	5.2	5.6	26.0	6.8	11	.....	3.4	3.8	4.0	4.5	6.1	7.8	36.4	35.9	.1
285	Central	2	747	Tr.	.5	.5	.3	.3	8.4	5.7	5.3	5.5	25.5	6.5	12	1.3	2.4	3.8	5.0	6.1	6.8	8.7	40.6	32.4	1.0
286	Los Angeles	4,6,7	747	Tr.	1.3	1.3	4.3	6.5	5.4	5.0	5.0	5.2	31.4	6.5	18	.....	3.4	3.9	4.2	4.3	5.6	7.1	35.0	30.4	1.9
287	Hog's Head	1,2	747	1.9	.....	.....	.....	.....	.....	.....	.....	.....	.0	.7	16	.....	8.3	6.5	5.0	5.8	7.5	7.4	41.2	55.1	1.8
288	Consolidated Elk	1	741	.1	2.5	2.5	5.3	6.2	5.5	5.0	4.9	5.0	31.9	6.1	17	.....	3.4	3.0	4.8	4.9	5.1	6.7	34.0	30.0	1.5
	Average (6 samples)		746	.4	1.1	1.1	2.1	3.1	4.5	4.1	4.6	4.6	23.0	5.8	15	.2	3.9	4.0	4.7	5.2	6.1	7.4	37.3	37.0	1.2

SANTA PAULA DISTRICT.

289	Empire	1	747	.....	2.6	2.6	3.5	4.6	4.8	5.0	5.6	6.1	29.6	7.1	20	.....	2.5	3.5	3.6	4.8	5.3	7.6	34.4	32.4	1.0
290	.....do	7,11	750	Tr.	1.3	1.3	4.1	5.6	6.2	5.5	5.1	5.6	32.1	5.9	15	.....	2.9	4.2	4.6	5.3	5.7	6.6	35.2	30.8	.6
291	.....do	3	747	.....	3.6	3.6	5.7	7.1	6.0	5.5	5.4	5.2	34.9	6.7	15	.....	4.7	4.9	5.0	5.6	5.8	6.8	39.5	21.0	1.0
292	Capital Crude		750	Tr.	.....	.....	1.1	3.1	4.9	5.4	5.2	4.5	24.2	5.8	15	.....	4.5	5.4	5.9	6.4	6.7	7.1	41.8	33.8	.2
293	Capital Crude, South		746	Tr.	.....	.....	.....	.....	4.7	6.2	5.2	4.7	20.8	5.8	15	.....	3.1	4.5	4.7	5.2	5.5	7.7	36.5	42.0	.7
294	Capital Crude, North	1	742	3.9	.....	.....	.....	.....	3.6	3.6	4.8	5.1	17.1	5.0	20	.....	2.3	3.3	4.3	4.8	5.4	7.1	32.2	46.3	.5
296	West Lake		750	.....	.6	.6	3.4	4.7	4.6	4.4	4.6	5.3	27.0	6.4	15	.....	4.0	4.7	4.8	5.4	5.6	8.4	39.3	32.4	.7
	Average (7 samples)		747	.6	1.2	1.2	2.5	3.6	5.0	5.1	5.1	5.2	26.5	6.1	16	.....	3.4	4.3	4.7	5.4	5.7	7.4	37.0	34.0	.7

ADAMS CANYON DISTRICT.

297	Tar Flat		748	Tr.	.....	.....	.....	.....	.....	0.4	9.4	8.7	18.5	10.5	18	.....	3.2	4.9	5.8	6.9	7.4	9.2	47.9	33.1	0.5
298	Wild Bill Canyon	27,28,29,31	743	Tr.	.....	.....	0.5	2.7	4.2	4.8	4.5	4.8	21.5	5.8	14	.....	5.4	5.8	3.7	5.0	6.2	8.9	40.8	37.0	.7
299	Salt Marsh		741	Tr.	.....	.....	.....	1.3	3.1	3.7	3.6	4.2	15.9	5.2	14	1.0	3.1	3.7	4.3	4.9	5.3	8.0	35.5	47.8	.8
	Average (3 samples)		744	Tr.	.....	.....	.2	1.3	2.4	3.0	5.8	5.9	18.6	7.2	15	.3	3.9	4.8	4.6	5.6	6.3	8.7	41.4	39.3	.7

WHEELER CANYON DISTRICT.

300	Burrows & Sons	2,3,5,6,7,8,9	747	.....	1.3	1.3	4.3	5.5	5.7	4.8	5.0	4.5	29.8	6.0	15	.....	3.8	4.0	4.2	4.7	5.1	6.3	34.1	33.8	1.0

[a] Lamp oil carried over with water.

FRACTIONAL DISTILLATION—Continued.

SUMMERLAND DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.								Pressure of mercury.	Lubricants.								Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.		150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
301	Churchill	8 wells.	753	0.4	.....	.....	.....	.....	.....	.....	.....	0.2	0.2	8.4	14	.....	4.3	6.1	10.3	6.5	7.7	11.4	54.7	44.6	0.1
302	Becker	7 wells.	747	.5	.....	.....	.....	.....	.....	.....	0.3	.3	.6	6.0	10	4.1	5.8	6.8	8.3	8.1	8.6	11.6	59.3	39.5	.1
303	Wilson	7 wells.	751	4.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.3	9	2.6	4.7	6.0	7.0	7.7	8.2	12.5	50.0	44.6	.8
304	J. B. Treadwell Consolidated	20	741	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.6	8	7.7	6.7	7.4	8.1	8.7	10.6	8.1	57.9	41.4	.7
305	Wakham (Sunset)	2 wells.	741	1.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	13	3.9	4.8	7.8	6.5	8.2	9.2	10.5	52.9	44.8	.7
307	Fort Duquesne	11	745	.1	.....	.....	.....	.....	.....	.....	.3	6.8	7.1	9.8	14	.....	4.6	4.9	6.1	8.2	6.5	11.2	51.3	41.0	.5
	Average (6 samples)		746	1.2	.....	.....	.....	.....	.....	.....	.1	1.2	1.3	4.7	11	3.0	5.2	6.5	7.7	7.9	8.5	10.9	54.4	42.6	.5

SANTA MARIA DISTRICT.

312	Kaiser	4	748	Tr.	1.7	1.7	6.6	5.9	5.4	4.4	4.6	4.2	31.1	4.8	38	.....	0.5	2.6	2.8	3.7	3.9	6.1	24.4	40.8	2.0
313	.....do	5	745	Tr.	1.7	1.7	5.4	5.7	5.3	4.7	4.5	4.3	29.9	4.9	35	.....	1.1	3.2	3.4	3.4	3.9	5.6	25.5	41.4	1.5
314	Rice Ranch	2	749	2.6	6.9	6.9	2.3	4.1	4.9	4.9	4.6	4.7	25.5	4.6	20	.....	1.8	2.6	3.4	4.0	3.5	6.5	26.4	37.1	1.5
315	Hobbs	7	749	Tr.	2.5	2.5	5.3	5.2	5.4	4.2	4.7	4.7	29.5	5.3	22	1.0	2.2	3.0	3.2	4.0	4.8	7.3	30.8	35.9	1.3
316	.....do	3	745	None.	2.5	2.5	4.6	5.7	4.9	4.8	4.2	4.8	29.0	5.2	24	.4	1.7	2.6	2.9	4.0	4.8	8.3	29.9	36.8	1.8
317	Fox	4	747	.1	1.3	1.3	2.7	4.6	4.7	4.5	3.6	3.3	23.4	4.9	22	.....	4.1	2.5	3.2	3.2	3.9	7.0	28.8	45.2	1.2
319	.....do	8	758	Tr.	1.1	1.1	4.9	6.1	5.2	4.6	4.0	3.8	28.6	5.5	22	.9	2.4	3.1	3.6	4.3	3.9	6.9	30.6	39.1	.6
320	.....do	1	754	Tr.	2.3	2.3	3.6	5.4	4.6	4.1	3.9	4.2	25.8	5.8	19	1.9	2.6	3.2	3.5	3.8	4.4	7.3	32.5	38.1	1.3
321	Pinal	8	752	None.	2.4	2.4	4.3	5.6	4.9	4.5	4.7	4.7	28.7	5.4	17	.....	3.9	3.2	3.3	3.5	4.2	6.5	30.0	37.8	1.1
322	.....do	2	751	Tr.	.8	.8	3.6	5.2	4.9	4.7	4.6	5.4	28.4	5.1	19	1.2	2.6	3.3	3.6	3.9	4.3	7.5	31.5	38.3	1.0
323	.....do	12	745	Tr.	.9	.9	3.6	5.3	5.0	4.6	4.7	4.9	28.1	5.8	18	1.7	2.8	3.1	3.4	3.7	4.3	7.9	32.7	37.6	.7
324	.....do	15	744	Tr.	.1	.1	2.0	4.3	4.9	5.3	4.0	4.7	25.2	5.8	18	1.6	3.0	3.3	3.9	4.2	4.3	7.7	33.8	40.2	.7
325	Brookshire	4	747	Tr.	2.1	2.1	3.8	5.0	5.4	4.5	4.5	4.5	27.7	5.0	20	1.0	2.8	3.2	3.5	3.2	4.2	7.4	30.3	38.5	1.4
326	Hartnell	1	738	Tr.	3.0	3.0	4.3	4.9	4.4	4.2	3.7	3.6	25.1	5.1	20	.9	2.4	3.0	3.7	3.7	5.0	6.8	30.6	39.5	1.8
327	.....do	4	742	Tr.	1.6	1.6	3.8	4.8	5.2	4.4	3.9	4.4	26.5	5.0	34	.....	1.4	2.5	2.9	3.9	4.6	7.4	27.7	42.2	2.0
329	Santa Maria Oil & Gas	8	742	Tr.	2.3	2.3	3.9	4.7	4.7	4.8	4.1	4.0	26.2	6.1	14	1.4	2.8	3.1	3.3	3.8	4.1	6.9	31.5	38.3	1.7
330	Folsom	8	742	None.	1.9	1.9	4.0	4.9	5.0	5.4	3.7	4.7	27.7	5.2	21	1.0	2.3	3.3	3.5	4.0	4.3	7.0	30.6	38.3	1.5
331	.....do	1	748	Tr.	2.5	2.5	4.7	4.8	4.8	4.2	3.8	4.0	26.3	5.2	22	1.5	2.9	2.8	4.1	3.5	3.9	7.4	31.3	38.3	1.6

332	.....do.....	6	746	None.	1.5	1.5	4.1	5.1	5.5	4.1	4.6	4.0	27.4	6.3	21	.8	2.6	3.5	3.4	3.7	4.2	7.1	31.6	38.3	1.2
333	.....do.....	5	750	Tr.	4.0	4.0	5.1	5.0	5.0	4.4	4.0	4.0	27.5	5.5	19	1.2	2.4	3.1	3.7	3.3	4.5	7.6	31.3	35.1	2.1
334	.....do.....	3	739	None.	2.4	2.4	4.6	5.5	5.2	4.1	4.3	5.0	28.7	5.7	17	1.4	2.5	2.6	4.0	4.6	3.9	6.5	31.2	36.2	1.5
335	California Coast or Escolla.....	5	740	Tr.	1.3	1.3	3.6	4.7	4.6	4.0	4.1	4.9	25.9	5.9	16	2.1	2.8	2.9	3.2	3.4	4.2	7.7	32.2	38.6	2.0
336	New Love (Union).....	5	741	Tr.	2.6	2.6	3.9	4.7	4.6	4.7	3.6	4.4	25.9	6.1	21	1.9	2.7	3.2	3.7	3.4	4.7	7.0	32.7	36.4	2.4
337	.....do.....	1	744	None.	1.1	1.1	4.4	7.3	4.8	3.9	4.8	4.5	29.7	5.8	21	1.0	2.2	2.6	4.2	3.8	4.5	7.6	31.7	36.4	1.1
338	Graciosa.....	5	748	None.	3.0	3.0	4.9	5.5	4.6	5.5	4.5	4.5	29.5	5.6	20	1.2	2.6	3.2	3.0	3.4	4.6	7.7	31.3	34.0	2.2
339	.....do.....	11	744	Tr.	2.2	2.2	4.8	4.9	5.0	3.9	4.4	4.7	27.7	5.5	19	.9	2.7	3.2	3.6	4.8	4.4	7.3	32.4	35.6	2.1
340	Western Union.....	10	743	Tr	.....	.....	.3	.8	2.3	3.3	4.6	5.1	16.4	6.7	20	1.3	3.2	3.5	4.3	4 0	5.4	7.9	36.3	46.4	.9
341	.....do.....	26	745	Tr	1.0	1.0	2.3	4.1	4.7	4.8	4.5	5.1	25.5	5.5	16	1.6	2.4	3.3	3.9	4.2	5.2	8.8	34.9	36.8	1.8
342	.....do.....	14	749	Tr.	.4	.4	1.2	2.2	3.0	3.9	5.6	4.8	20.7	5.9	18	2.4	3.0	3.8	3.4	4.8	5.1	8.4	36.8	40.6	1.5
513	New Love (Union)	12	744	0.1	1.4	1.4	2.9	4.9	5.4	5.0	4.5	4.8	27.5	5.1	18	.....	1.5	2.6	3.9	4.0	4.4	8.0	29.5	39.5	2.0
514	.....do.....	2	749	.1	5.8	5.8	5.7	5.7	4.2	3.8	3.8	3.9	27.1	5.5	17	.....	1.1	1.3	3.0	4.0	4.5	7.9	27.3	37.3	2.4
515	.....do.....	15	750	.1	3.3	3.3	7.4	5.6	4.7	4.4	4.5	4.2	30.8	5.3	18	.....	.....	2.6	2.4	5.1	5.1	7.5	28.0	36.1	1.7
516	.....do.....	13	740	1.6	4.5	4.5	1.4	2.5	7.6	6.4	4.4	4.9	27.2	5.1	15	.7	1.9	2.7	3.5	4.0	4.2	7.4	29.5	35.8	1.4
517	.....do.....	9	749	.1	1.3	1.3	3.3	5.6	6.0	5.2	4.6	4.6	29.3	5.5	16	.....	1.0	2.6	3.6	4.0	4.2	6.8	27.7	40.2	1.1
519	.....do.....	1	745	.1	1.4	1.4	3.8	7.0	7.7	6.3	5.2	4.6	34.6	4.8	15	.....	.4	2.8	4.6	4.8	4.5	7.2	29.1	33.5	1.3
520	.....do.....	20	746	Tr.	.3	.3	2.1	7.4	7.0	6.5	6.0	4.5	33.5	6.1	15	.....	1.6	2.9	3.6	4.3	4.3	8.0	30.8	34.5	.9
521	.....do.....	25	743	Tr.	.6	.6	3.4	6.5	6.3	5.5	4.6	4.4	30.7	5.4	15	.....	1.5	2.3	3.9	4.3	4.8	7.3	29.5	37.2	2.0
522	.....do.....	22	748	.1	2.6	2.6	3.6	6.9	5.9	6.0	4.5	4.2	31.1	5.1	12	.....	2.2	3.3	3.9	4.2	4.2	6.9	29.8	34.5	1.9
524	Teresa Bell.....	2	744	1.1	.....	.....	.....	.....	.....	1.5	2.3	3.7	7.5	5.7	14	.....	.8	3.1	3.3	4.1	4.5	7.8	29.3	60.1	2.0
525	New Penn.....	3	743	.1	.9	.9	4.0	6.5	6.5	6.2	4.8	4.5	32.5	5.1	14	.....	2.0	3.0	3.4	4.2	4.0	7.5	29.2	36.1	1.2
	Average (40 samples).....		746	.2	2.0	2.0	3.8	5.0	5.0	4.6	4.4	4.4	27.2	5.4	20	.8	2.2	2.9	3.5	4.0	4.4	7.3	30.5	38.6	1.5

LOMPOC DISTRICT.

343	Eefson.....	4	742	Tr.	.....	.....	0.7	1.7	3.7	4.4	4.6	4.8	19.9	5.4	16	.....	1.6	3.0	4.1	3.8	3.6	7.0	28.5	50.6	1.0
344	Purisma.....	7	747	2.2	.....	.....	.....	2.2	3.4	3.3	3.4	3.4	15.7	4.1	16	.....	1.7	2.2	2.8	2.9	3.1	4.6	21.4	59.4	1.3
346	Hill.....	4	744	Tr.	.....	.....	1.1	1.9	3.3	3.6	3.7	4.2	17.8	4.7	16	.....	1.8	2.6	3.1	3.6	4.2	5.4	25.4	55.9	.9
	Average (3 samples).....		744	.7	0.0	0.0	.6	1.9	3.5	3.8	3.9	4.1	17.8	4.7	16	.....	1.7	2.6	3.3	3.4	3.6	5.8	25.1	55.3	1.1

ARROYO GRANDE DISTRICT.

347	Pacific Oil Fields (Ltd.).	1	734	0.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.7	15	3.0	3.7	4.3	4.7	5.2	6.2	9.1	38.9	60.4	0.5
348	Arroyo Grande.....	1,2,3,4,5	753	.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	16	1.3	4.4	5.0	6.1	6.6	6.7	9.7	41.8	57.9	.2
	Average (2 samples).....		744	.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.4	16	2.2	4.0	4.6	5.4	5.9	6.4	9.4	40.3	59.1	.4

FRACTIONAL DISTILLATION—Continued.

COALINGA DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.								Pressure of mercury.	Lubricants.								Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.		150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
17	California Oil Fields (Ltd.)		8	748	Tr.	.....	.....	.....	.....	.....	1.3	4.9	6.4	12.6	7.9	20	.....	2.5	4.3	6.0	6.9	7.9	9.7	45.2	41.7	0.5
25	Hanford		7	747	Tr	.....	.....	.....	.....	.....	.....	.7	3.8	4.5	7.6	20	.....	5.6	6.6	7.6	8.5	9.4	10.8	56.1	39.0	.4
395a	Standard		68	754	Tr.	.....	.....	.....	.....	1.4	3.8	5.5	10.7	7.9	20	.....	4.3	6.0	6.5	6.6	7.4	9.5	48.2	40.4	.7
398a	....do		63	737	Tr.	.....	.....	.....	.....	.....	.....	.2	2.4	2.6	8.4	20	.....	4.6	6.2	7.3	8.3	8.9	10.7	54.4	42.8	.2
410a	Coalinga Mohawk		1	742	Tr.	.....	.....	.....	.....	.....	3.8	7.1	9.6	20.5	11.2	20	.....	1.9	5.0	6.0	7.4	8.4	10.0	49.9	28.8	.8
612	Shawmut		5	739	0.5	.....	.....	.....	.....	.....	.....	.....	.4	.4	7.3	18	.....	4.3	5.7	6.7	8.4	9.2	11.0	52.6	45.9	.6
613	Empire		1	751	Tr.	.....	.....	.....	.....	.....	.....	.....	.8	.8	13.1	20	.....	3.4	5.1	8.1	8.9	9.2	11.1	58.9	40.0	.3
614	Zier		6	750	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.9	20	.....	6.2	6.8	7.2	8.6	9.8	12.8	52.3	47.5	.2
615	Confidence		6	736	Tr	.....	.....	.....	.....	.....	.....	.....	.4	.4	6.1	20	.....	4.5	6.8	7.1	8.1	8.7	9.3	50.6	48.7	.3
616	Commercial Petroleum		12	746	.2	.....	.....	.....	.....	.....	.....	.6	1.2	1.8	9.5	20	.....	5.6	7.2	8.0	8.5	8.7	10.1	57.6	39.9	.5
617	Main State		5	736	.2	.....	.....	.....	.....	.....	.....	.....	.1	.1	.2	20	3.8	5.4	6.8	8.1	8.4	8.7	12.1	53.5	45.5	.7
618	Commercial Petroleum		5	735	Tr.	.....	.....	.....	.....	.....	.....	.1	1.5	1.6	11.5	20	.....	4.4	5.8	7.5	8.6	9.2	10.3	57.3	40.7	.4
619	Shawmut		4	753	.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.5	20	.....	4.1	5.6	6.9	8.5	9.1	11.8	46.5	52.6	.4
620	Zier		12	755	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.9	20	.....	6.5	8.1	8.8	9.9	10.3	11.1	55.6	44.0	.4
621	KTO		3	744	Tr	.....	.....	.....	.....	.....	.3	1.8	5.1	7.2	7.8	20	.....	5.1	6.1	6.2	6.7	7.2	8.6	47.7	44.4	.7
622	Shawmut		6	753	.3	.....	.....	.....	.....	.....	.....	.....	.5	.5	7.9	15	1.7	5.9	6.5	7.8	8.7	9.2	10.7	58.4	40.5	.3
623	Arica		6	752	Tr.	.....	.....	.....	.....	.....	.....	.....	.2	.2	9.0	15	.....	5.2	6.4	7.0	8.1	8.6	10.5	54.8	44.8	.2
624	....do		4	744	2.5	.....	.....	.....	.....	.....	.....	.....	.7	.7	9.0	20	1.9	4.4	6.0	7.2	7.6	8.3	10.0	54.4	41.9	.5
625	Coalinga Pacific		1	748	.5	.....	.....	.....	.....	.....	.....	.....	.6	.6	7.6	20	2.4	5.5	6.7	7.8	8.4	9.5	11.0	58.9	39.5	.5
626	Security		1	746	1.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.5	15	.....	6.4	6.9	7.4	8.4	8.8	10.4	49.8	49.0	.2
627	Nevada Petroleum		1	738	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.4	15	.....	4.7	5.1	6.6	7.6	8.3	9.6	49.3	50.4	.3
628	California Coalinga		1	748	2.2	.....	.....	.....	.....	.....	.....	.....	1.3	1.3	1.6	20	2.7	6.1	6.7	7.4	8.1	9.1	9.5	51.2	45.2	.1
629	Section Seven		4	752	Tr.	.....	.....	.....	.....	.....	.....	.....	0.6	0.6	8.9	20	.....	5.4	7.9	8.6	9.0	9.2	11.4	60.4	38.5	0.5
630	KTO		15	744	Tr.	.....	.....	.....	.....	.....	.....	.....	.1	.1	.6	20	.....	5.1	6.1	7.2	8.6	9.2	10.4	47.2	52.6	.1
631	....do		35	748	0.8	.....	.....	.....	.....	.....	.....	.....	.4	.4	5.0	20	.....	5.2	6.8	7.1	8.1	8.4	11.4	52.0	46.1	.7
632	....do		20	744	Tr.	.....	.....	.....	.....	.....	.....	0.2	.7	.9	7.5	20	.....	4.6	5.5	5.8	7.6	9.0	11.1	51.1	47.7	.3
633	....do		25	738	Tr.	.....	.....	.....	.....	.....	.....	.1	.7	.8	5.2	20	0.8	4.7	6.2	7.9	8.6	9.6	11.5	54.5	44.3	.4
634	Pacific States Top Sand		1	746	Tr.	.....	0.7	4.2	5.3	5.3	4.7	6.1	26.3	7.9	15	.....	5.5	6.0	6.5	7.2	7.6	8.5	49.2	23.8	.7
635	American Petroleum		8	746	.7	.....	.....	.....	.....	.....	.....	.2	.2	.4	5.3	20	1.8	3.8	5.4	7.1	7.9	9.6	12.3	53.2	45.2	.5
636	Silver Tip		1	746	Tr.	.....	.....	.4	1.9	2.7	3.1	3.6	11.7	5.9	15	.....	4.8	5.6	6.3	7.1	7.4	8.6	45.7	41.6	1.0
637	....do		2	746	Tr.	.....	.....	1.9	4.1	5.3	6.0	6.9	24.2	11.0	15	.....	3.3	3.4	5.6	6.4	6.8	8.4	44.9	30.0	.9
638	Nevada Petroleum		1	747	.3	.....	.....	.....	.....	.....	.....	.....	.....	1.0	15	1.6	3.4	5.1	6.4	7.2	7.9	11.2	43.8	55.6	.3
639	De Lux		1	745	1.5	.....	.....	.....	.....	.....	.....	.....	.....	1.1	14	.....	3.8	5.3	6.3	7.3	8.4	10.2	42.4	55.6	.5
640	Stockholders		5	745	Tr.	.....	.....	.....	.....	.....	1.6	5.9	7.0	14.5	9.8	20	.....	4.9	6.8	7.4	8.1	8.3	9.7	55.0	29.9	.6

641	Standard	46	752	Tr.			.1	1.8	3.9	5.6	5.8	7.2	24.4	8.5	20		4.2	5.2	5.9	6.4	7.1	9.4	46.7	27.8	1.1
642	do	76	738	Tr.					.4	1.0	3.2	3.9	8.5	6.4	20		4.3	5.3	6.7	8.1	8.6	10.1	49.5	41.0	1.0
643	do	60	726	8.7								2.9	2.9	8.9	20		3.3	5.9	6.6	7.7	8.3	9.0	49.7	38.2	.5
644	do	49	761	Tr.			.2	.3	1.6	3.7	6.0	11.8	8.4	20		4.5	6.1	7.3	8.5	8.9	10.3	54.0	33.4	.8	
645	do	77	749	Tr.							.6	.6	8.0	14		5.7	7.0	7.9	8.7	8.9	10.7	56.9	42.2	.3	
646	do	6	733	Tr.					.2	3.1	4.4	5.8	13.5	7.8	20		4.7	5.4	6.4	7.3	7.7	9.5	48.8	37.2	.5
647	California Oil Fields (Ltd.)	1	748	Tr.			.7	3.2	5.1	5.9	7.3	22.2	9.4	20		3.2	6.0	6.1	6.6	7.4	8.9	47.6	29.4	.8	
648	do	43	746	Tr.				.3	2.3	6.5	7.4	16.5	9.2	20	1.1	3.1	6.9	8.0	8.2	8.4	9.3	54.2	28.8	.5	
649	do	25	752	Tr.			.4	1.5	3.1	3.6	4.3	5.4	18.3	6.7	20		4.4	5.5	6.1	6.8	8.0	10.3	47.8	32.7	1.2
650	do	26	750	None.					.7	2.8	5.2	6.3	15.0	8.2	14		6.4	7.1	7.4	7.9	8.1	9.8	54.9	29.4	.7
651	do	53	742	Tr.					.4	2.5	5.2	6.7	14.8	8.7	20		3.9	5.7	6.2	7.2	7.6	9.3	48.6	36.0	.6
652	do	51	740	Tr.							.7	7.5	8.2	9.6	15		4.1	5.2	6.8	8.0	8.5	10.1	52.3	39.2	.3
653	do	7	746	Tr.			.3	1.5	4.0	4.9	6.9	17.6	8.3	20		1.8	3.7	6.2	7.1	7.8	9.7	44.6	36.9	.9	
654	do	5	748	Tr.					.4	4.2	6.3	10.9	8.8	20		4.8	5.8	6.7	7.6	8.1	10.4	52.2	36.7	.2	
655	do	5	745	Tr.				1.5	3.6	4.8	5.5	15.4	7.4	15		4.3	5.8	6.4	7.1	7.4	7.9	46.3	37.7	.6	
656	do	46	745	Tr.			.4	2.7	5.1	6.3	7.4	21.9	9.7	20		3.9	5.1	5.7	6.3	6.7	7.8	45.2	32.5	.4	
657	do	2	745	Tr.				.3	1.7	4.8	6.9	13.7	8.8	20	1.9	5.2	5.8	6.3	7.6	7.8	10.2	53.6	31.9	.8	
658	do	2	746	Tr.			.3		.6	3.9	5.0	6.1	15.9	8.6	20	1.5	3.1	4.3	5.4	6.7	7.4	10.8	47.8	35.8	.5
664	do	4	752	Tr.			.5	1.3	3.3	4.4	6.0	15.5	8.5	20		2.6	5.6	6.2	7.2	8.3	10.0	48.4	35.2	.9	
665	W. K. Oil Co	4	743	Tr.					.1	5.0	7.1	12.2	9.0	20		1.3	4.4	6.0	6.5	8.3	10.0	45.5	41.9	.4	
666	California Oil Fields (Ltd.)	16	746	Tr.					.5	4.6	6.7	11.8	9.0	20		1.9	5.2	6.3	7.3	8.1	10.0	47.8	39.9	.5	
667	Turner Oil Co	1	742	Tr.					.6	3.4	7.7	11.7	8.9	20		2.7	4.7	6.2	7.2	8.0	9.6	47.3	40.8	.2	
	Average (56 samples)		745	.4			.0	.2	.6	1.3	2.4	3.5	8.0	7.2	19	.4	4.4	5.9	6.9	7.7	8.3	10.1	50.9	40.2	.5

MIDWAY DISTRICT.

1066	Mascot	4	730	Tr.						0.1	0.8	4.7	5.6	8.2	25		3.7	4.6	6.0	6.1	7.0	11.8	47.4	46.6	0.4
586	Hawaiian	1	746	Tr.					0.3	6.0	7.1	7.5	20.9	9.8	9		2.7	4.9	6.0	6.4	6.5	9.3	45.6	32.8	1.7
587	Manchuria Midway	1	744	4.1										1.2	10			4.1	5.6	6.5	5.5	11.3	34.2	59.8	1.9
588	Dome	1	743	.1							.6	6.6	7.2	11.4	12			5.4	6.6	7.3	8.0	10.1	48.8	43.6	.3
589	American Oil Fields (Ltd.)	1	746	.1								.4	.4	11.6	12		3.7	6.3	7.8	7.9	7.6	10.9	55.8	43.2	.5
590	Hawaiian	2	746	.1							3.3	10.2	13.5	9.8	9		2.1	5.4	6.2	6.9	7.2	10.6	48.2	37.9	.3
591	Bear Creek	3	745	4.3										1.6	10		6.4	6.2	7.1	7.9	7.7	11.2	48.1	46.8	.8
593	CCM (Santa Fe)	1	742	.1						.3	4.3	9.5	14.1	10.2	9			7.4	6.6	6.9	7.2	10.3	48.6	36.8	.4
594	United Oil	2	745	Tr.				0.3	5.2	6.9	6.6	7.4	26.4	8.0	9		2.7	4.2	5.3	5.9	6.3	8.9	41.3	4g 39	.4
598	American Oil Fields (Ltd.)	79	748	Tr.				.2	2.5	8.1	6.4	6.5	23.7	8.6	9		3.3	4.9	5.6	5.8	5.5	9.7	43.4	32.0	.9
600	La Bell	1	746	Tr.			0.7	4.0	6.4	5.9	6.1	6.4	29.5	8.4	9		3.6	4.0	6.1	4.9	5.7	8.3	41.0	28.3	1.2
601	California Midway	1	746	Tr.				.4	4.9	6.2	6.9	8.1	26.5	8.5	9		2.0	4.3	5.5	6.2	6.4	9.5	42.4	30.2	.9
602	Rock	2	742	Tr.					.2	2.9	7.1	8.6	18.8	9.3	10		1.7	5.2	6.5	6.0	6.8	10.2	45.7	34.7	.8
603	Lakeview No. 1	1	744	.3				.2	.3	1.5	7.6	6.5	16.1	7.8	9		2.5	4.3	5.2	6.0	6.8	10.1	42.7	40.5	.4
604	Western Minerals	8	744	Tr.				.2	10.6	8.3	9.7	10.9	39.7	10.5	10		3.5	5.6	6.2	6.5	6.1	7.7	46.1	13.7	.5
605	do	11	745	Tr.						.1	13.1	13.9	27.1	11.8	10		1.8	6.8	8.0	9.4	6.8	8.9	53.5	18.9	.5
	Average (16 samples)		744	.6			.0	.3	1.9	2.9	5.0	6.7	16.8	8.5	11		2.5	5.2	6.3	6.7	6.7	9.9	45.8	36.1	.7

a See Bull. 19, Bureau of Mines, p. 13.

b See Bull. 19, Bureau of Mines, p. 15.

FRACTIONAL DISTILLATION—Continued.

SUNSET DISTRICT.

Laboratory No.	Lease.	Well No.	Pressure of mercury.	Water.	Naphthas.		Lamp oils.							Pressure of mercury.	Lubricants.							Residue (asphaltum).	Distilling loss.
					Up to 150° C.	Unrefined.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	Unrefined.	300–325° C.	150–175° C.	175–200° C.	200–225° C.	225–250° C.	250–275° C.	275–300° C.	300–325° C.	Unrefined.		
			Mm.	*P. ct.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*Mm.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. c.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. c.*
449[a]	Monte Cristo	12	726	Tr.	.....	.....	.....	0.8	2.9	3.5	3.8	4.2	15.2	5.3	21	0.7	2.7	3.8	4.5	4.2	5.8	9.7	36.7	47.2	0.9
451[a]	Webster	1	738	0.2	.....	.....	.....	1.6	1.7	2.9	3.4	3.6	13.2	4.7	22	1.3	2.7	3.8	4.5	3.4	5.4	12.2	38.0	47.2	1.4
563	Union	4	755	.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.3	14	.....	5.9	10.0	11.1	12.0	8.5	12.0	77.8	21.8	.3
567	Pacific Midway	1	741	None.	.....	.....	.....	1.4	3.9	4.4	4.1	4.2	18.0	6.3	21	1.2	3.3	4.3	4.4	4.9	6.0	8.6	39.0	42.6	.4
568	Maricopa National	1	733	None.	0.1	0.1	1.2	3.1	4.3	4.5	4.6	5.2	22.9	6.7	20	1.1	3.4	3.9	4.4	4.9	5.7	8.2	38.3	38.2	.5
569	KTO	25	749	.2	.2	.2	.4	1.4	3.4	3.9	3.6	4.0	16.7	5.5	20	.8	2.8	3.7	4.3	4.6	5.9	9.5	37.1	45.1	.7
570	.....do	27	736	.4	.2	.2	.6	1.1	2.6	3.6	3.6	4.4	15.9	5.6	21	.3	2.2	3.5	4.7	5.9	5.5	9.3	37.0	45.2	1.3
571	.....do	1	748	Tr.	.....	.....	.....	0.9	2.9	3.6	3.5	10.9	10.9	5.2	23	1.1	2.7	3.8	4.8	4.5	5.8	10.0	37.9	49.3	1.9
572	Monte Cristo	8	737	.1	.....	.....	.5	1.5	2.6	3.4	3.5	3.6	15.1	5.4	21	.....	3.4	3.6	4.2	4.8	6.2	10.6	38.2	45.5	1.1
573	.....do	4	750	.4	.....	.....	.....	1.3	1.9	2.7	3.1	4.4	13.4	5.5	21	.....	3.5	3.3	3.9	4.5	6.0	9.5	36.2	49.0	1.0
574	.....do	1	750	.1	.....	.....	.....	.....	.....	3.0	3.3	4.2	10.5	5.7	20	.....	3.3	3.7	4.2	4.6	6.5	10.4	38.4	50.1	.9
575	Ruby	8	734	.4	.....	.....	.....	.....	.....	2.2	2.7	4.5	9.4	6.2	21	.....	3.0	3.2	4.7	5.2	5.8	9.6	37.7	51.8	.7
576	.....do	10	748	.6	.....	.....	.....	.....	.....	2.1	2.0	4.0	8.1	5.4	21	.....	1.8	4.0	4.2	3.9	6.8	11.1	37.2	53.2	.9
577	Lakeview	1	751	.1	.....	.....	.....	.3	.8	6.0	5.8	5.5	18.4	7.5	13	.....	2.2	3.9	4.5	5.3	6.3	9.8	39.5	41.4	.6
578	Sunset Monarch	.....	746	1.4	.7	.7	.2	.2	.4	.7	4.0	5.3	10.8	6.9	14	.7	3.0	3.9	4.5	5.6	6.0	11.0	41.6	44.8	.7
379	Nevada Midway	1	744	.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.0	13	.....	.....	5.3	6.2	7.9	7.8	11.8	52.0	47.5	.4
580	Standard	3	745	Tr.	.....	.....	.....	.9	4.3	6.1	5.3	5.4	22.0	6.6	23	.....	1.0	3.0	4.5	5.1	6.4	10.3	36.9	40.3	.8
581	.....do	4	748	.8	.....	.....	.4	.3	.5	1.4	3.8	4.7	11.1	7.5	10	2.0	3.3	4.1	5.0	6.0	6.6	10.0	44.5	42.5	1.1
582	.....do	8	750	.2	.....	.....	.....	.....	.....	.1	1.5	8.3	9.9	10.6	14	.....	1.1	4.1	5.9	9.0	6.3	9.4	46.4	42.9	.6
583	.....do	1	748	Tr.	.....	.....	.2	1.0	5.9	7.3	6.9	6.6	27.9	7.0	10	.6	2.9	3.0	4.8	6.1	6.6	9.0	40.0	31.3	.8
584	Globe Exploration Co	1	744	.3	.....	.....	.....	.....	.....	.....	.3	.3	.6	5.5	13	.....	2.9	4.9	6.5	7.9	7.7	10.3	45.7	52.8	.6
592	Mays	1	753	Tr.	.....	.....	.....	2.3	5.8	6.5	4.4	5.4	24.4	6.4	20	1.3	4.0	4.4	5.0	5.4	6.4	8.2	41.1	34.0	.5
595	United Oil	5	748	Tr.	.....	.....	.....	.....	.....	2.1	3.9	5.7	11.7	7.3	20	.....	4.6	4.9	5.2	6.3	7.0	9.5	44.8	42.9	.6
596	.....do	6	734	Tr.	.....	.....	.....	2.5	5.4	5.2	5.3	5.4	23.8	6.5	20	.....	4.9	5.3	5.4	5.9	6.3	7.7	42.0	33.5	.7
597	CCM (Santa Fe)	3	753	Tr.	.....	.....	.6	4.5	5.1	5.4	4.9	5.2	25.7	6.6	20	.....	2.6	4.1	4.8	5.2	5.8	7.9	37.0	36.6	.7
599	Mammoth	1	742	Tr.	.....	.....	1.5	5.5	6.2	6.2	4.9	5.4	29.7	6.2	20	.....	3.4	4.3	4.7	5.2	5.7	7.3	36.8	33.2	.3
606	Standard	2	753	1.1	2.5	2.5	1.1	3.9	5.6	4.6	6.3	5.3	26.8	7.2	21	.....	2.3	3.5	4.6	4.9	5.3	8.6	36.4	30.9	2.3
607	.....do	1	745	9.5	5.6	5.6	.5	.3	1.0	3.5	6.8	5.3	17.4	7.2	21	.....	2.4	3.2	4.6	4.7	5.2	7.6	34.9	31.1	1.5
608	.....do	9	738	Tr.	.....	.....	2.2	4.5	3.4	5.4	4.9	5.3	25.7	7.3	21	.....	2.7	3.7	5.2	5.1	5.8	7.8	37.6	34.6	2.1

609	Nevada Midway	2	754	Tr.	.....	.....	.....	.....	.....	.....	.....	3.9	3.9	8.6	21	.....	4.2	4.8	5.7	7.4	7.4	11.5	49.6	46.1	.4
610	North American Consolidated	5	745	.4	.....	.....	.....	.....	.....	.8	1.1	5.8	7.7	7.8	21	.4	3.6	4.9	6.1	6.0	7.4	11.0	47.2	44.2	.5
611	Babcock Petrol	7	741	Tr.	.1	.1	.6	2.6	4.6	5.4	5.5	5.5	24.2	7.7	19	.....	2.9	4.1	5.1	5.0	5.1	10.9	40.8	33.8	1.1
	Average (32 samples)		745	.5	.3	.3	.3	1.3	2.3	3.3	3.7	4.4	15.3	7.1	19	.4	3.0	4.2	5.1	5.7	6.3	9.6	41.4	41.6	.9

a See Bull. 19, Bureau of Mines, p. 16.

COMMERCIAL VALUES.

LOS ANGELES CITY DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B. t. u.*	*B. t. u.*
166	Nov. 2		Horton & Curtis.	2	0.9578	16.17	10,431	18,776	149,832
167	...do...		C. C. Harris...	4–5	.9680	14.63	10,397	18.715	150,936
168	...do...		...do...	19,20	.9510	17.21	10,460	18.828	149,182
169	...do...		Giegerich...	1,5,22	.9579	16.15	10,417	18,751	149,648
170	...do...		Doran, Brown & Price.	2.3	.9655	15.00	10,134	18,241	146,734
171	...do...		Tyler...	7	.9677	14.67	10,245	18,441	148,681
172	...do...		...do...	1,2,3,4	.9631	15.36	10,392	18,706	150,101
173	...do...		C. C. Harris...	11,12	.9616	15.59	10,383	18,689	149,731
174	...do...		...do...	14,25	.9754	13.53	9,967	17,941	145,799
175	...do...		Daggert & Fletcher.	{1,3,4,5,6,8,9,10,12}	.9736	13.80	9,279	16,702	135,480
176	...do...		Palin...	14–19	.9591	15.97	10,345	18,621	148,797
177	Nov. 6		Davis & Harrison.	4	.9510	17.21	10,411	18,740	148,485
178	Nov. 2		C. C. Harris...	18 or 2	.9542	16.72	10,383	18,689	148,578
179	...do...		E. A. Clampitt.	6	.9592	15.95	10,284	18,511	147,934
180	...do...		...do...	22	.9682	14.60	10,330	18,594	149,992
181	...do...		Los Angeles R. R.	4	.9685	14.55	10,333	18,599	150,079
182	...do...		Richard Green.	12–15	.9581	16.12	10,411	18,740	149,592
183	Nov. 4		I. W. Shirley...	5,13–19	.9616	15.59	10,325	18,585	148,897
184	...do...		Whittier Consolidated.	6	.9565	16.37	10,419	18,754	149,454
185	...do...		McCray...	{5,2,3,1,2,7,10,11,12,13}	.9579	16.15	10,426	18,767	149,776
186	...do...		Koford...	7,8	.9626	15.44	10,330	18,594	149,124
187	...do...		Woolner...	21–27	.9858	12.02	9,311	16,760	137,655
		Average (22 samples)			.9629	15.40	10,246	18,443	147,931

LA BREA, SALT LAKE, OR SANTA FE DISTRICT (WEST OF LOS ANGELES).

	1907.								
188	Nov. 6		Hancock Ranch	139	0.9612	15.65	10,177	18.319	146,704
189	...do...		...do...	6	.9412	18.75	10,307	18,553	145,487
190	...do...		...do...	37	.9364	19.51	10,282	18,508	144,394
191	...do...		...do...	49	.9395	19.02	10,374	18.673	146,163
192	...do...		...do...	3	.9652	15.05	10,183	18.329	147,396
193	...do...		...do...	11	.9644	15.17	10,188	18.338	147,346
194	...do...		Union (Pitcher & Garbutt).	3	.9245	21.43	10,453	18,815	144,924
195	...do...		...do...	4	.9114	23.61	.....	.....	.....
196	...do...		Gilmore...	5	.9573	16.24	10,126	18,227	145,375
197	...do...		Pacific Light & Power Co.	3	.9537	16.80	10,262	18,472	146,775
198	...do...		...do...	9	.9673	14.73	10,017	18,031	145,315
199	...do...		Clark...	1–15	.9706	14.24	10,121	18,218	147,324
200	...do...		Rancho La Brea	3	1.0200	2.84	9,029	16,252	138,113
201	...do...		...do...	7,8	.9700	14.33	10,175	18.315	148,016
202	...do...		Salt Lake (Hancock).	200	.9900	11.41	9,930	17,874	147,430
203	...do...		...do...	324	.9771	13.28	10,134	18,241	148,496
204	...do...		...do...	346,347,349	.9773	13.25	10,107	18.193	148,137
		Average (17 samples)			.9604	15.61	10,117	18,210	146,087

COMMERCIAL VALUES.

LOS ANGELES CITY DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	° *C.*	° *C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.9800	103	143	105.2	Tr.	0.37	0.0	100.0	0.0	5.0	36.2	14.4	0.4	44.0	166
8.0650	116	157	312.9	Tr.	.42	.0	100.0	.0	1.7	33.2	12.5	.5	52.1	167
7.9234	110	146	44.0	Tr.	.31	.0	100.0	.0	5.2	35.0	13.9	.3	45.6	168
7.0808	115	152	149.2	0.5	.37	.0	99.5	.0	4.7	31.9	12.8	.8	49.3	169
8.0442	119	154	220.3	2.5	.45	.0	97.5	.0	4.4	34.2	13.3	.8	44.8	170
8.0625	123	159	404.3	2.0	.39	.0	98.0	.0	5.8	31.4	12.0	.8	48.0	171
8.0242	110	145	210.4	Tr.	.45	.0	100.0	.0	2.3	36.1	13.8	.4	47.4	172
8.0117	117	151	183.0	.3	.42	.0	99.7	.0	4.0	33.2	13.0	.4	49.1	173
8.1266	.....	.....	1,058.0	7.2	.52	.0	92.8	.0	1.3	25.2	10.7	.9	54.7	174
8.1116	.....	.....	480.9	10.5	.41	.0	89.5	.0	.7	31.5	13.3	1.1	42.9	175
7.9908	111	150	112.2	2.2	.46	.0	97.8	.0	4.0	34.9	13.0	.6	45.3	176
7.9234	109	146	52.5	.3	.42	.0	99.7	.0	4.3	35.3	13.4	.5	46.2	177
7.9500	106	145	76.5	Tr.	.51	.0	100.0	.0	3.5	38.6	13.9	.4	43.6	178
7.9917	100	135	178.3	.2	1.06	.0	99.8	.0	7.9	25.8	9.9	.8	55.4	179
8.0667	98	136	202.5	.1	1.01	.0	99.9	.0	4.9	33.4	12.4	.7	48.5	180
8.0692	105	141	278.3	.2	.92	.0	99.8	.0	3.8	19.1	7.3	.5	[a] 69.1	181
7.9825	95	135	90.9	Tr.	.79	.0	100.0	.0	6.3	35.8	13.8	.3	43.8	182
8.0117	106	145	126.6	.3	.83	.0	99.7	.0	5.8	34.0	12.7	.8	46.4	183
7.9692	96	140	87.1	Tr.	.71	.0	100.0	.0	5.3	24.6	9.3	.6	[a] 60.2	184
7.9808	98	138	95.1	.3	.68	.0	99.7	.0	8.8	32.6	13.8	.6	43.9	185
8.0200	95	134	112.2	Tr.	1.04	.0	100.0	.0	6.8	35.1	14.1	.5	43.5	186
8.2133	.....	.....	1,413.9	11.2	1.08	.0	88.8	.0	3.2	29.1	11.6	1.1	43.8	187
8.0227	107	145	272.5	1.7	.62	.0	98.3	.0	4.5	32.1	12.5	.6	48.6	

LA BREA, SALT LAKE, OR SANTA FE DISTRICT (WEST OF LOS ANGELES).

8.0083	39	86	131.0	0.1	2.33	0.0	99.9	0.0	13.2	22.0	9.6	0.9	[a] 54.2	188
7.8417	26	61	37.2	Tr.	2.04	.0	100.0	.0	18.2	21.0	9.6	1.4	[a] 49.8	189
7.8017	14	44	23.5	Tr.	1.96	.0	100.0	.0	19.7	22.3	9.4	1.4	47.2	190
7.8275	41	72	19.6	Tr.	1.37	.0	100.0	.0	18.9	26.8	11.0	.3	43.0	191
8.0417	36	84	168.2	Tr.	2.47	.0	100.0	.0	12.9	20.6	9.2	.8	56.5	192
8.0350	40	86	162.2	Tr.	2.41	.0	100.0	.0	11.4	22.9	9.4	1.0	55.3	193
7.7026	31	61	11.7	Tr.	1.13	.0	100.0	.0	21.8	25.4	11.1	1.2	[a] 40.5	194
7.5934	56	91	10.0	Tr.	.....	.0	100.0	.0	19.4	29.7	12.4	.1	[a] 38.4	195
7.9758	31	81	114.3	.8	2.53	.0	99.2	.0	13.4	20.5	9.4	.9	55.0	196
7.9458	32	75	65.2	Tr.	2.23	.0	100.0	.0	14.9	23.0	9.2	.9	52.0	197
8.0592	58	95	218.6	1.5	2.41	.0	98.5	.0	12.2	22.7	9.9	.8	52.9	198
8.0867	55	110	335.8	.3	2.56	.0	99.7	.0	9.5	23.9	10.4	1.0	54.9	199
8.4982	82	133	5,499.2	10.3	2.53	.0	89.7	.0	3.6	16.8	7.2	1.4	60.7	200
8.0817	44	94	232.5	Tr.	2.57	.0	100.0	.0	10.4	18.9	8.2	.9	61.6	201
8.2483	74	105	1,511.7	1.8	2.75	.0	98.2	.0	4.1	22.9	10.3	1.3	59.6	202
8.1408	55	115	652.1	Tr.	2.63	.0	100.0	.0	8.6	19.2	8.2	.9	63.1	203
8.1425	61	114	570.7	Tr.	2.66	.0	100.0	.0	8.6	20.3	8.8	.6	61.7	204
8.0018	46	89	574.3	.9	2.29	.0	99.1	.0	13.0	22.3	9.6	.9	53.3	

COMMERCIAL VALUES—Continued.

FULLERTON DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B.t.u.*	*B.t.u.*
205	Nov. 8	Sec. 9, T. 3 S., R. 9 W.	Columbia	17	0.8891	27.46	10,606	19,091	141,418
206	do	do	do	22	.8650	31.85	10,674	19,213	138,464
207	do	do	Fullerton	2	.8626	32.30	10,629	19,132	137,498
208	do	Sec. 8, T. 3 S., R. 9 W.	Santa Fe	1	.9410	18.78	10,394	18,709	146,679
209	do	do	do	24	.9284	20.80	10.451	18,812	145,513
210	do	do	do	26	.9300	20.54	10,459	18,826	145,871
211	do	do	do	49	.9213	21.96	10,448	18,806	144,353
212	do	do	do	42	.9203	22.12	10,471	18,848	144,519
213	do	do	Fullerton Consolidated.	16	.9504	17.31	10,367	18,661	147,765
214	do	do	Union	33	.9750	13.59	9,944	17,899	145,399
215	do	do	do	35	.9448	18.18	10,388	18,698	147,185
		Average (11 samples)			.9207	22.26	10,439	18,790	144.060

BREA CANYON DISTRICT.

	1907.								
217	Nov. 8	Sec. 6, T. 3 S., R. 9 W.	Union	28	0.9272	20.99	10,410	18,738	144,753
218	do	Sec. 1, T. 3 S., R. 10 W.	do	15	.9370	19.41	10,400	18,720	146,141
219	do	do	do	21	.9108	23.71	10,472	18,850	143,041
220	do	do	Brea Canyon	7,1	.9115	23.59	10,467	18,841	143,084
221	do	do	do	8	.9270	21.02	10,416	18,749	144,806
222	do	do	do	12	.9189	22.36	10,443	18,797	143,908
223	do	do	do	18	.9520	17.06	10,348	18,626	147,736
224	do	do	do	19	.9375	19.33	10,419	18,754	146,486
225	do	Sec. 2, T. 3 S., R. 10 W.	Menges	2	.8808	28.95	10,383	18,689	137,149
		Average (9 samples)			.9225	21.82	10,418	18,752	144,123

PUENTE HILLS DISTRICT.

	1907.								
226	Nov. 9	Sec. 35, T. 2 S., R. 10 W.	Puente	52	0.9138	23.21	10,616	19,109	145,484
227	do	do	do	21	.8669	31.49	10,647	19,165	138,423
228	do	do	do	45	.8837	28.42	10,592	19,066	140,375
229	do	do	do	26	.8951	26.41	10,627	19,129	142,656
230	do	Sec. 34, T. 2 S., R. 10 W.	do	32	.8750	30.00	10,649	19,168	139,739
231	do	do	do	60	.8880	27.66	10,587	19,057	140,993
232	do	do	do	70	.8849	28.21	10,600	19,080	140,669
233	do	do	do	4	.8978	25.94	10,520	18,936	141,643
234	do	do	do	16	.9146	23.07	10,491	18,884	143,898
		Average (9 samples)			.8911	27.16	10,592	19,066	141,543

WHITTIER DISTRICT.

	1907.								
235	Nov. 13	Sec. 26, T. 2 S., R. 11 W.	Murphy	21	0.9203	22.12	10,533	18,959	145,370
236	do	do	do	5	.9282	20.83	10,495	18,891	146,092
237	do	do	do	8	.9225	21.76	10,521	18,938	145,556
238	do	do	do	14	.9302	20.51	10,485	18,873	146,268
239	do	Sec. 23, T. 2 S., R. 11 W.	Central	50	.9300	20.54	10,479	18,862	146,150
240	do	do	do	1	.9586	16.05	10,369	18,664	149,064
241	do	do	do	4	.9590	15.99	10,370	18,666	149,141
242	do	Sec. 22, T. 2 S., R. 11 W.	do	8	.9094	23.95	10,506	18,911	143,285
243	do	do	do	2	.9608	15.71	10,361	18,650	149,293
244	do	do	Fidelity	4	.9410	18.78	10,422	18,760	147,078
245	do	do	do	5	.9355	19.65	10,428	18,770	146,297
246	do	do	Turner	6	.9440	18.31	10,475	18,855	148,295
247	do	do	do	8	.9553	16.55	10,365	18,657	148,495
248	do	do	Home	6	.9413	18.73	10,440	18,792	147,376
249	do	do	do	18	.9506	17.28	10,370	18,666	147,835
250	do	do	do	14	.9388	19.13	10,550	18,990	148,534
251	do	do	Whittier Crude	8	.9205	22.09	10,463	18,833	144,434
252	do	Sec. 21, T. 2 S., R. 11 W.	do	10	.9480	17.68	10,449	18,808	148,553
		Average (18 samples)			.9386	19.20	10,449	18,808	147,062

COMMERCIAL VALUES—Continued.

FULLERTON DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	*° C.*	*° C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.4076	8	30	2.4	Tr.	0.39	0.5	99.5	0.5	40.5	18.4	8.6	0.8	31.2	205
7.2068	− 8	1	1.5	Tr.	.27	.2	99.8	.2	40.0	18.0	7.3	1.3	[a]33.2	206
7.1868	−10	1	1.5	Tr.	.23	1.8	98.2	1.8	43.0	18.7	8.8	2.0	[a]25.7	207
7.8400	27	68	29.4	Tr.	1.13	.0	100.0	.0	18.5	27.7	12.0	.9	40.9	208
7.7351	18	61	18.2	Tr.	1.02	.0	100.0	.0	17.6	24.4	10.5	1.8	45.7	209
7.7484	20	70	19.8	Tr.	1.10	.0	100.0	.0	16.9	26.0	10.7	1.0	[a]45.4	210
7.6759	9	48	13.0	Tr.	.92	.2	99.8	.2	20.3	25.0	10.9	1.3	42.3	211
7.6676	6	42	11.7	Tr.	.88	.1	99.9	.1	19.9	24.5	10.5	1.9	43.1	212
7.9184	62	113	94.1	Tr.	1.33	.0	100.0	.0	6.7	31.2	12.6	.7	48.8	213
8.1233	.....	.....	974.2	2.5	1.46	.0	97.5	.0	2.2	26.6	10.8	1.7	[a]56.2	214
7.8717	38	87	49.5	Tr.	1.04	.0	100.0	.0	12.6	24.9	10.4	1.1	51.0	215
7.6711	17.9	52.1	110.5	.2	.89	.3	99.5	.3	21.7	24.1	10.3	1.3	42.1	

BREA CANYON DISTRICT.

7.7251	8	39	11.7	Tr.	0.83	0.0	100.0	0.0	20.9	26.0	11.7	1.1	40.3	217
7.8067	19	49	21.7	Tr.	.94	.0	100.0	.0	18.2	25.2	11.0	.5	45.1	218
7.5884	1	19	5.1	Tr.	.75	.5	99.5	.5	27.8	25.5	11.3	1.1	33.8	219
7.5943	2	27	5.0	Tr.	.77	.0	100.0	.0	28.4	22.7	10.4	1.4	37.1	220
7.7234	7	37	10.9	Tr.	.84	.1	99.9	.1	24.9	25.1	11.5	1.2	37.2	221
7.6559	2	27	6.8	Tr.	.82	.0	100.0	.0	28.1	22.5	10.0	1.5	37.9	222
7.9317	43	88	56.8	Tr.	.97	.0	100.0	.0	13.5	25.6	11.0	.6	49.3	223
7.8109	− 5	14	6.0	Tr.	.90	.7	99.3	.7	25.3	22.9	10.3	1.9	38.9	224
7.3385	24	58	20.3	Tr.	1.02	.0	100.0	.0	21.0	25.3	11.1	1.3	41.3	225
7.6861	11	40	16.0	Tr.	.87	.1	99.9	.1	23.1	24.5	10.9	1.2	40.2	

PUENTE HILLS DISTRICT.

7.6134	0	23	2.7	Tr.	0.37	0.1	99.9	0.1	32.6	22.2	9.5	0.6	[a]35.0	226
7.2227	−10	3	1.8	Tr.	.26	2.4	97.6	2.4	33.8	24.5	10.5	1.6	[a]27.2	227
7.3626	− 7	13	2.6	Tr.	.42	.6	99.4	.6	32.8	24.0	10.5	1.8	[a]30.3	228
7.4576	14	39	3.6	Tr.	.26	.0	100.0	.0	27.7	26.9	11.8	.8	[a]32.8	229
7.2902	− 2	12	2.1	Tr.	.31	.0	100.0	.0	36.2	24.6	11.1	.8	[a]27.3	230
7.3985	− 7	14	3.1	Tr.	.42	.9	99.1	.9	31.3	21.5	9.8	1.3	[a]35.2	231
7.3726	− 3	17	2.8	Tr.	.46	1.0	99.0	1.0	33.0	23.1	10.0	1.4	[a]31.5	232
7.4801	−10	0	3.1	Tr.	.43	2.4	97.6	2.4	33.4	21.2	9.8	1.5	31.7	233
7.6201	0	28	5.8	Tr.	.52	.0	100.0	.0	30.1	20.1	9.3	.7	39.8	234
7.4242	− 2	18	3.1	Tr.	.38	.8	99.2	.8	32.3	23.1	10.3	1.2	32.3	

WHITTIER DISTRICT.

7.6676	28	62	7.4	Tr.	0.41	0.0	100.0	0.0	22.0	30.2	12.3	0.4	35.1	235
7.7334	38	75	11.9	Tr.	.53	.0	100.0	.0	22.0	28.9	12.6	.9	35.6	236
7.6859	37	77	9.5	Tr.	.48	.0	100.0	.0	22.2	28.5	12.5	.4	36.4	237
7.7501	47	90	15.1	Tr.	.55	.0	100.0	.0	14.2	31.3	13.2	.4	40.9	238
7.7484	36	70	13.4	Tr.	.55	.0	100.0	.0	19.8	26.9	11.9	.8	40.6	239
7.9867	85	120	84.1	Tr.	.70	.0	100.0	.0	8.6	33.2	12.7	.4	45.1	240
7.9900	77	117	94.4	Tr.	.73	.0	100.0	.0	8.3	33.1	13.3	.3	45.0	241
7.5768	− 3	23	3.9	Tr.	.53	.2	99.8	.2	30.4	25.1	11.1	1.3	31.9	242
8.0050	67	112	118.4	Tr.	.87	.0	100.0	.0	8.9	30.5	12.4	.3	47.9	243
7.8400	39	75	20.6	Tr.	.66	.0	100.0	.0	19.2	28.1	12.2	.7	39.8	244
7.7942	25	59	14.6	Tr.	.67	.0	100.0	.0	19.9	27.4	11.9	.6	40.2	245
7.8650	56	95	27.2	Tr.	.67	.0	100.0	.0	17.0	30.5	13.3	.4	38.8	246
7.9592	75	120	78.5	Tr.	.76	.0	100.0	.0	8.4	32.8	13.2	.7	44.9	247
7.8425	50	89	19.8	Tr.	.56	.0	100.0	.0	18.4	31.9	13.4	.4	35.9	248
7.9200	65	109	49.2	0.3	.73	.0	99.7	.0	9.5	33.1	13.0	.5	43.6	249
7.8217	40	74	9.5	Tr.	.33	.0	100.0	.0	22.9	30.7	13.2	1.0	32.2	250
7.6692	8	34	6.3	Tr.	.69	.0	100.0	.0	23.6	26.7	11.1	.9	37.7	251
7.8984	65	110	38.5	Tr.	.51	.0	100.0	.0	12.0	33.1	13.4	.6	40.9	252
7.8197	46	84	34.6	.0	.61	.0	100.0	.0	17.1	30.1	12.6	.6	39.6	

[a] Asphaltum and paraffin.

COMMERCIAL VALUES—Continued.

COYOTE HILLS DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B. t. u.*	*B. t. u.*
253	Nov. 9	Sec. 18, T. 3 S., R. 10 W...	Murphy.....	1	0.9165	22.75	10,494	18,889	144,235
254	...do.....	.....do.....	.....do.....	2	.8940	26.60	10,589	19,060	141,968
		Average (2 samples).....			.9052	24.68	10,542	18,974	143,102

NEWHALL DISTRICT.

	1907.								
255	Nov. 15	Sec. 7, T. 3 N., R. 15 W...	Elsmire(Union)	2	0.9545	16.67	10,427	18,769	149,260
256	...do.....	.....do.....	.....do.....	20	.9680	14.63	10,323	18,581	149,856
257	...do.....	Sec. 7, T. 3 N., R. 16 W...	Alpine (Santa Ana).	1	.9700	14.33	10,182	18,328	148,121
258	...do.....	.....do.....	Santa Ana.....	3	.9710	14.18	10,246	18,443	149,204
259	...do.....	.....do.....	Zenith.....	2,1	.9550	16.60	10,418	18,752	149,204
260	...do.....	Sec. 6, T. 3 N., R. 15 W...	Kellerman.....		.9390	19.10	10,529	18,952	148,269
261	...do.....	Sec. 4, T. 3 N., R. 15 W...	J. G. Evans (New Century).	1	.8420	36.27	10,717	19,291	135,330
262	Nov. 21	Sec. 16, T. 3 N., R. 16 W..	Wiley.....	6	.8825	28.64	10,657	19,183	141,045
263	Nov. 25	Secs. 1 and 2, T. 3 N., R. 17 W.	C. S. O. W.....	1,2,4,5,6,7,12,13,15,18,19,21,22,23,24,25,27,28,29,Star.	.8385	36.96	10,726	19,307	134,879
		Average (9 samples).....			.9245	21.93	10,469	18,845	145,019

PIRU DISTRICT.

	1907.								
264	Dec. 5	Tps. 3 and 4 N., R. 18 W..	Union.....	13,14,15,16,17,18	0.9232	21.65	10,287	18,517	142,427
265	Dec. 6	T. 3 N., R. 18 W.....	Union Oil Co...	56	.9053	24.64	10,262	18,472	139,327
266	...do.....	.....do.....	.....do.....	33	.8981	25.88	10,300	18,540	138,727
267	...do.....	.....do.....	.....do.....	21	.9051	24.68	10,244	18,439	139,047
268	...do.....	.....do.....	.....do.....	58	.8782	29.42	10,504	18,907	138,339
269	...do.....	.....do.....	.....do.....	15	.8832	28.51	10,394	18,709	137,670
270	...do.....	.....do.....	.....do.....	29	.8998	25.59	10,922	19,660	147,387
271	...do.....	.....do.....	.....do.....	34	.9107	23.73	10,421	18,758	142,328
272	Dec. 4	Sec. 8, T. 4 N., R. 18 W...	Modella.....	1,4,5,6,12,16,17,24	.8914	27.06	10,488	18,878	140,203
273	...do.....	.....do.....	.....do.....	7,19,21,22,28,29	.8936	26.67	10,379	18,682	139,089
274	Dec. 5	Sec. 12, T. 4 N., R. 19 W..	Sunset.....	2,4,6,7,9	.9692	14.45	10,073	18,131	146,408
275	...do.....	.....do.....	Harris.....	1,2	.9674	14.72	9,931	17,876	144,081
276	...do.....	Sec. 13, T. 4 N., R. 19 W..	Fortuna.....	3,4,5,6,8,14,16,18	.9605	15.76	10,158	18,284	146,318
		Average (13 samples).....			.9143	23.29	10,336	18,604	141,642

BARDSDALE DISTRICT.

	1907.								
277	Dec. 7	Sec. 12, T. 3 N., R. 19 W..	Bronson.....	1	0.9025	25.12	10,431	18,776	141,182
278	...do.....	Sec. 12, T. 3 N., R. 20 W..	Robertson.....	7	.8900	27.30	10,456	18,821	139,560
279	...do.....	.....do.....	.....do.....	2,12,13	.8981	25.88	10,432	18,778	140,508
280	...do.....	.....do.....	Bookhart.....	3	.9301	20.52	6,326	11,387	88,240
281	...do.....	.....do.....	.....do.....	5	.9353	19.68	10,240	18,432	143,631
282	...do.....	.....do.....	.....do.....	6	.9532	16.87	9,805	17,649	140,163
		Average (6 samples).....			.9182	22.56	9,615	17,307	132,214

COMMERCIAL VALUES—Continued.

COYOTE HILLS DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	° *C.*	° *C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.6359	35	56	16.0	Tr.	1.38	0.0	100.0	0.0	15.1	25.8	10.4	0.9	[a] 47.8	253
7.4485	19	43	5.0	Tr.	.89	.0	100.0	.0	21.2	27.1	10.5	1.0	[a] 40.2	254
7.5422	27	50	10.5	Tr.	1.14	.0	100.0	.0	18.2	26.4	10.4	1.0	44.0	

NEWHALL DISTRICT.

7.9525	95	122	78.1	Tr.	0.39	0.0	100.0	0.0	6.0	34.8	12.7	0.3	46.2	255
8.0650	96	121	237.2	0.2	.50	.0	99.8	.0	2.6	30.9	11.3	.4	54.6	256
8.0817	94	130	289.3	.7	.54	.0	99.3	.0	2.1	32.8	12.2	2.1	50.1	257
8.0900	92	114	374.3	1.3	.57	.0	98.7	.0	.3	31.4	11.9	.3	54.8	258
7.9567	71	100	61.7	Tr.	.43	.0	100.0	.0	10.6	28.6	10.7	.5	49.6	259
7.8234	78	104	19.0	Tr.	.24	.0	100.0	.0	14.2	32.3	12.0	.5	41.0	260
7.0152	28	44	1.0	Tr.	.04	.0	100.0	.0	89.4	4.2	4.1	.4	1.9	261
7.3526	− 2	14	1.9	Tr.	.25	.1	99.9	.1	35.0	27.7	11.7	1.2	24.3	262
6.9860	−10	0	1.3	Tr.	.15	.9	99.1	.9	47.2	26.7	11.0	1.8	12.4	263
7.7026	60	83	118.2	.2	.35	.1	99.7	.1	23.0	27.7	10.8	.8	37.3	

PIRU DISTRICT.

7.6917	13	38	13.7	Tr.	1.50	1.5	98.5	1.5	21.6	21.5	9.0	0.2	[a] 46.2	264
7.5426	7	27	3.8	Tr.	.62	.3	99.7	.3	23.4	29.0	11.8	.4	[a] 35.1	265
7.4826	0	27	3.8	Tr.	.53	.1	99.9	.1	26.1	23.4	9.2	.2	[a] 41.0	266
7.5409	3	24	3.5	Tr.	.63	.3	99.7	.3	29.7	29.2	11.6	.9	[a] 28.3	267
7.3168	− 8	6	3.5	Tr.	.66	1.5	98.5	1.5	26.7	24.8	9.9	.6	[a] 36.5	268
7.3585	−12	0	4.6	Tr.	.58	.8	99.2	.8	26.9	21.2	9.0	1.5	[a] 40.6	269
7.4968	5	34	3.6	Tr.	.58	.1	99.9	.1	23.6	28.7	11.4	.1	[a] 36.1	270
7.5876	12	34	4.6	Tr.	.63	.0	100.0	.0	30.0	23.7	10.1	.5	[a] 35.7	271
7.4268	− 3	10	3.3	Tr.	.43	.4	99.6	.4	36.6	26.4	11.2	.5	[a] 24.9	272
7.4451	− 3	11	2.1	Tr.	.38	.5	99.5	.5	36.9	25.4	10.7	.5	[a] 26.0	273
8.0750	90	131	248.5	0.3	.80	.0	99.7	.0	.7	31.1	10.3	.4	[a] 57.2	274
8.0600	114	144	253.4	1.5	.58	.0	98.5	.0	.1	37.8	14.2	.7	[a] 45.7	275
8.0025	76	130	62.2	.2	.74	.0	99.8	.0	.3	43.4	16.1	1.2	[a] 38.8	276
7.6175	23	47	47.0	.2	.67	.4	99.4	.4	21.7	28.1	11.1	.6	37.9	

BARDSDALE DISTRICT.

7.5193	−18	0	5.1	Tr.	1.61	2.5	97.5	2.5	25.1	26.5	11.0	0.6	[a] 34.3	277
7.4151	−15	0	2.8	Tr.	1.45	1.0	99.0	1.0	23.4	27.2	11.1	.8	[a] 36.5	278
7.4826	−14	2	4.0	Tr.	1.61	2.4	97.6	2.4	23.5	24.0	9.9	.9	[a] 39.3	279
7.7492	20	68	61.7	10.1	1.73	4.3	85.6	4.3	7.2	24.4	9.0	1.1	[a] 43.9	280
7.7925	1	44	23.6	Tr.	2.42	.5	99.5	.5	18.7	24.0	9.2	.4	[a] 47.2	281
7.9417	20	65	38.0	14.9	2.36	.0	85.1	.0	2.4	28.0	8.9	.6	[a] 45.2	282
7.6501	− 1	30	22.5	4.2	1.86	1.8	94.0	1.8	16.7	25.7	9.8	.7	41.1	

[a] Asphaltum and paraffin.

COMMERCIAL VALUES—Continued.

SESPE DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B.t.u.*	*B.t.u.*
283	Dec. 7	Sec. 6, T. 4 N., R. 20 W...	My Dream.....	.....	0.9030	25.04	10,585	19,053	143,343
284	Dec. 9	....do.....	Kentuck.....	7 wells.	.8961	26.23	10,563	19,013	141,949
285	...do.....	Sec. 6, T. 4 N., R. 19 W...	Central.....	2	.8863	27.96	10,608	19,094	140,996
286	Dec. 7	....do.....	Los Angeles....	4, 6, 7	.8776	29.53	10,604	19,087	139,560
287	Dec. 9	Sec. 32, T. 5 N., R. 19 W..	Hog's Head....	1, 2	.9283	20.81	10,379	18,682	144,490
288	...do.....	Sec. 33, T. 5 N., R. 19 W..	Consolidated Elk.	1	.8790	29.27	10,599	19,078	139,718
		Average (6 samples).	.....	.....	.8950	26.47	10,556	19,001	141,676

SANTA PAULA DISTRICT.

	1907.								
289	Dec. 12	Sec. 14, T. 4 N., R. 21 W..	Empire.....	1	0.8930	26.77	10,535	18,963	141,087
290	...do.....	Sec. 13, T. 4 N., R. 21 W..	.....do.....	7, 11	.8845	28.28	10,552	18,994	139,972
291	...do.....	Sec. 18, T. 4 N., R. 20 W..	.....do.....	3	.8520	34.32	10,579	19,042	135,170
292	Dec. 10	Sec. 17, T. 4 N., R. 21 W..	Capital Crude..	.....	.9150	23.01	10,399	18,718	142,695
293	...do.....	Sec. 18, T. 4 N., R. 21 W..	Capital Crude (South).	.....	.9290	20.70	10,408	18,734	145,003
294	...do.....	.....do.....	Capital Crude (North).	.....	.9420	18.62	10,339	18,610	146,059
296	...do.....	Sec. 13, T. 5 N., R. 22 W..	West Lake.....	.....	.9000	25.56	10,433	18,779	140,812
		Average (7 samples).	.....	.....	.9022	25.32	10,463	18,834	141,543

ADAMS CANYON DISTRICT.

	1907.								
297	Dec. 11	Sec. H, T. 4 N., R. 21 W...	Tar Flat.....	.....	0.9120	23.51	10,630	19,134	145,388
298	...do.....	.....do.....	Wild Bill Canyon.	27, 28, 29, 31	.9090	24.02	10,534	18,961	143,599
299	...do.....	.....do.....	Salt Marsh.....	.....	.9400	18.94	10,407	18,733	146,711
		Average (3 samples).	.....	.....	.9203	22.16	10,524	18,943	145,233

WHEELER CANYON DISTRICT.

	1907.								
300	Dec. 11	Sec. S, T. 4 N., R. 22 W...	Burrows & Sons	2, 3, 5, 6, 7, 8, 9	0.8875	27.75	10,529	18,952	140,137

SUMMERLAND DISTRICT.

	1907.								
301	Dec. 13	.....	Churchill.....	8 wells.	0.9620	15.53	10,410	18,738	150,185
302	...do.....	.....	Becker.....	7 wells.	.9640	15.23	10,344	18,619	149,542
303	...do.....	.....	Wilson.....	7 wells.	.9740	13.74	10,057	18,103	146,906
304	...do.....	.....	J. B. Treadwell Consolidated.	20	.9670	14.78	10,399	18,718	150,805
305	...do.....	.....	Wakham (Sunset).	6	.9710	14.18	10,169	18,304	148,079
307	...do.....	.....	Fort Duquesne.	11	.9530	16.90	10,434	18,781	149,121
		Average (6 samples).	.....	.....	.9652	15.06	10,302	18,544	149,106

COMMERCIAL VALUES—Continued.

SESPE DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	° *C.*	° *C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.5234	4	40	6.0	None.	0.45	0.9	99.1	0.9	22.3	27.2	10.6	0.7	[a] 38.3	283
7.4659	0	23	4.8	0.2	.39	1.4	98.4	1.4	24.8	26.9	10.7	.1	[a] 35.9	284
7.3843	5	28	3.4	Tr.	.27	.5	99.5	.5	24.3	29.7	12.1	1.0	32.4	285
7.3118	− 8	11	2.1	Tr.	.33	1.3	98.7	1.3	30.1	25.9	10.4	1.9	30.4	286
7.7342	120	147	46.9	1.9	.38	.0	98.1	.0	.0	30.0	11.2	1.8	55.1	287
7.3235	−12	− 9	1.9	.1	.25	2.5	97.4	2.5	30.6	25.2	10.1	1.5	30.0	288
7.4572	18	40	10.8	.4	.34	1.1	98.5	1.1	22.0	27.5	10.8	1.2	37.0	

SANTA PAULA DISTRICT.

7.4401	−12	5	2.3	None.	0.21	2.6	97.4	2.6	28.3	25.4	10.3	1.0	32.4	289
7.3693	−10	3	2.0	Tr.	.21	1.3	98.7	1.3	30.7	25.9	10.7	.6	30.8	290
7.0985	(?)	−20	1.4	None.	.73	3.6	96.4	3.6	33.5	29.4	11.5	1.0	21.0	291
7.6234	10	27	4.2	Tr.	.42	.0	100.0	.0	23.1	30.8	12.1	.2	33.8	292
7.7401	22	41	9.0	Tr.	.83	.0	100.0	.0	19.8	26.7	10.8	.7	42.0	293
7.8484	37	60	18.9	3.9	1.03	.0	96.1	.0	16.3	23.4	9.6	.5	46.3	294
7.4984	− 8	7	2.6	None.	.32	.6	99.4	.6	25.8	29.0	11.5	.7	32.4	296
7.5169	6	18	5.8	.5	.54	1.2	98.3	1.2	25.4	27.2	10.9	.7	34.1	

ADAMS CANYON DISTRICT.

7.5984	75	92	6.2	Tr.	0.52	0.0	100.0	0.0	17.4	35.6	13.4	0.5	33.1	297
7.5734	10	23	5.4	Tr.	.67	.0	100.0	.0	20.5	30.1	11.7	.7	37.0	298
7.8317	29	49	22.3	Tr.	.62	.0	100.0	.0	15.1	26.1	10.2	.8	47.8	299
7.6678	38	55	11.3	Tr.	.60	.0	100.0	.0	17.7	30.6	11.8	.7	39.3	

WHEELER CANYON DISTRICT.

7.3943	−12	2	2.3	None.	0.52	1.3	98.7	1.3	28.6	25.4	9.9	1.0	33.8	300

SUMMERLAND DISTRICT.

8.0150	102	127	123.0	0.4	0.30	0.0	99.6	0.0	0.2	40.0	14.7	0.1	44.6	301
8.0317	98	128	152.9	.5	.35	.0	99.5	.0	.6	43.8	15.5	.1	39.5	302
8.1150	112	147	469.2	4.6	.42	.0	95.4	.0	.0	35.7	14.3	.8	44.6	303
8.0567	103	131	216.9	Tr.	.37	.0	100.0	.0	.0	42.8	15.1	.7	41.4	304
8.0900	108	140	320.3	1.6	.38	.0	98.4	.0	.0	38.3	14.6	.7	44.8	305
7.9400	79	104	50.4	.1	.32	.0	99.9	.0	6.6	37.9	13.9	.5	41.0	307
8.0414	100	130	222.1	1.2	.36	.0	98.8	.0	1.2	39.8	14.7	.5	42.6	

[a] Asphaltum and paraffin.

COMMERCIAL VALUES—Continued.

SANTA MARIA DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B.t.u.*	*B. t. u.*
312	Dec. 18	Rancho Puenta de la Laguna.	Kaiser	4	0.9005	25.47	10,386	18,695	140,261
313	...do	...do	...do	5	.8975	25.99	10,383	18,689	139,749
314	...do	...do	Rice Ranch	2	.9034	24.97	10,336	18,605	140,036
315	...do	...do	Hobbs	7	.8995	25.64	10,428	18,770	140,668
316	Dec. 17	...do	...do	3	.9011	25.37	10,375	18,675	140,204
317	Dec. 18	...do	Fox	4	.9260	21.19	10,178	18,320	141,341
319	Dec. 17	...do	...do	8	.9050	24.70	10,425	18,765	141,490
320	...do	...do	...do	1	.9021	25.19	10,432	18,778	141,134
321	Dec. 19	...do	Pinal	8	.9036	24.94	10,405	18,929	140,999
322	...do	...do	...do	2	.9031	25.02	10,427	18,769	141,224
323	...do	...do	...do	12	.9045	24.78	10,415	18,747	141,276
324	...do	...do	...do	15	.9187	22.39	10,393	18,707	143,187
325	...do	...do	Brookshire	4	.9020	25.21	10,381	18,686	140,427
326	...do	Rancho Todos Santos	Hartnell	1	.9042	24.83	10,393	18,707	140,927
327	...do	...do	...do	4	.9080	24.19	10,354	18,637	140,991
329	...do	...do	Santa Maria Oil & Gas.	8	.9039	24.88	10,395	18,711	140,911
330	...do	Rancho Puenta de la Laguna.	Folsom	8	.8975	25.99	10,432	18,778	140,414
331	...do	...do	...do	1	.8992	25.69	10,425	18,765	140,584
332	...do	...do	...do	6	.8980	25.90	10,471	18,848	141,017
333	...do	...do	...do	5	.8934	26.70	10,434	18,781	139,796
334	...do	...do	...do	3	.8977	25.95	10,431	18,776	140,431
335	...do	Rancho Todos Santos	California Coast or Escolla.	5	.9105	23.76	10,219	18,394	139,535
336	Dec. 18	Rancho Los Alamos	New Love (Union).	5	.9002	25.52	10,368	18,662	139,967
337	...do	...do	...do	1	.9022	25.18	10,466	18,839	141,609
338	...do	...do	Graciosa	5	.8974	26.01	10,396	18,713	139,913
339	...do	...do	...do	11	.9017	25.26	10,460	18,828	141,447
340	...do	...do	Western Union	10	.9436	18.37	10,304	18,547	145,811
341	...do	...do	...do	26	.9131	23.32	10,410	18,738	142,551
342	...do	...do	...do	14	.9310	20.38	10,326	18,587	144,174
	1909.								
513	Aug. 4		New Love (Union).	12	.8988	25.76	10,421	18,758	140,467
514	...do		...do	2	.8928	26.81	10,765	19,377	144,136
515	...do		...do	15	.9080	24.19	10,445	18,801	142,231
516	...do		...do	13	.8953	26.37	10,422	18,760	139,936
517	...do		...do	9	.8987	25.78	10,392	18,706	140,063
519	...do		...do	1	.8887	27.53	10,480	18,864	139,675
520	...do		...do	20	.9015	25.30	10,446	18,803	141,227
521	...do		...do	25	.9002	25.52	10,435	18,783	140,874
522	...do		...do	22	.8950	26.42	10,473	18,851	140,568
524	Aug. 5		Teresa Bell	2	.9630	15.38	10,041	18,074	145,013
525	Aug. 4		New Penn	3	.9027	25.09	10,432	18,778	141,227
		Average (40 samples)			.9053	24.68	10,400	18,720	141,187

LOMPOC DISTRICT.

	1907.								
343	Dec. 20	Mission de la Purisma	Eefson	4	0.9310	20.38	10,225	18,405	142,762
344	...do	...do	Purisma	7	.9430	18.46	10,107	18,193	142,937
346	...do	...do	Hill	4	.9290	20.70	10,225	18,405	142,457
		Average (3 samples)			.9343	19.85	10,186	18,334	142,719

ARROYO GRANDE DISTRICT.

	1907.								
347	Dec. 21		Pacific Oil Fields (Ltd.)	1	0.9730	13.88	10,182	18,328	148,578
348	...do		Arroyo Grande	1, 2, 3, 4, 5	.9760	13.44	10,234	18,421	149,792
		Average (2 samples)			.9745	13.66	10,208	18,374	149,185

COMMERCIAL VALUES—Continued.

SANTA MARIA DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	*° C.*	*° C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.5026	8	10	4.1	Tr.	1.66	1.7	98.3	1.7	29.9	17.6	8.0	2.0	40.8	312
7.4776	−10	8	4.1	Tr.	1.77	1.7	98.3	1.7	28.7	18.6	8.1	1.5	41.4	313
7.5268	− 9	26	5.5	2.6	1.69	6.9	90.5	6.9	24.4	19.3	8.2	1.5	37.1	314
7.4943	− 6	19	3.7	Tr.	1.69	2.5	97.5	2.5	28.3	22.7	9.3	1.3	35.9	315
7.5076	− 7	14	4.5	None.	1.85	2.5	97.5	2.5	27.8	21.7	9.4	1.8	36.8	316
7.7151	3	35	14.5	.1	2.42	1.3	98.6	1.3	22.4	21.4	8.4	1.2	45.2	317
7.5401	− 1	21	4.8	Tr.	1.77	1.1	98.9	1.1	27.5	22.7	9.0	.6	39.1	319
7.5159	− 5	13	4.8	Tr.	1.77	2.3	97.7	2.3	24.7	24.3	9.3	1.4	38.0	320
7.5284	− 7	8	4.5	None.	1.87	2.4	97.6	2.4	27.5	22.4	8.8	1.1	37.8	321
7.5243	0	24	5.0	Tr.	1.86	.8	99.2	.8	27.2	23.3	9.4	1.0	38.3	322
7.5359	− 1	22	4.9	Tr.	1.85	.9	99.1	.9	26.9	24.3	9.6	.7	37.6	323
7.6542	9	43	9.5	Tr.	2.09	.1	99.9	.1	24.1	25.2	9.7	.7	40.2	324
7.5151	−12	7	5.0	Tr.	1.97	2.1	97.9	2.1	26.5	22.4	9.1	1.4	38.5	325
7.5334	−10	12	6.1	Tr.	2.14	3.0	97.0	3.0	24.1	22.5	9.1	1.8	39.5	326
7.5651	− 2	16	7.8	Tr.	2.37	1.6	98.4	1.6	25.4	20.0	8.8	2.0	42.2	327
7.5309	− 4	13	6.1	Tr.	2.13	2.3	97.7	2.3	25.1	23.6	9.0	1.7	38.3	329
7.4776	−10	5	4.6	None.	1.90	1.9	98.1	1.9	26.5	22.6	9.2	1.5	38.3	330
7.4918	− 8	10	5.1	Tr.	1.99	2.5	97.5	2.5	25.2	23.3	9.1	1.6	38.3	331
7.4818	− 8	13	4.7	None.	1.83	1.5	98.5	1.5	26.3	23.5	9.2	1.2	38.3	332
7.4435	−12	8	3.9	Tr.	1.73	4.0	96.0	4.0	26.4	23.1	9.3	2.1	35.1	333
7.4793	− 5	15	4.2	None.	1.73	2.4	97.6	2.4	27.5	23.3	9.1	1.5	36.2	334
7.5859	0	30	9.1	Tr.	2.29	1.3	98.7	1.3	24.8	24.1	9.2	2.0	38.6	335
7.5001	−12	8	5.0	Tr.	2.12	2.6	97.4	2.6	24.8	24.5	9.3	2.4	36.4	336
7.5168	4	24	5.3	None.	1.93	1.1	98.9	1.1	28.5	23.4	9.5	1.1	36.4	337
7.4768	− 8	12	4.2	None.	1.92	3.0	97.0	3.0	28.3	23.2	9.3	2.2	34.0	338
7.5126	− 4	20	5.4	Tr.	2.12	2.2	97.8	2.2	26.6	23.9	9.6	2.1	35.6	339
7.8617	33	68	47.2	Tr.	2.07	.0	100.0	.0	15.6	27.0	10.1	.9	46.4	340
7.6076	− 1	29	10.0	Tr.	2.25	1.0	99.0	1.0	24.4	25.6	10.4	1.8	36.8	341
7.7567	4	51	20.9	Tr.	1.77	.4	99.6	.4	19.7	27.4	10.4	1.5	40.6	342
7.4884	− 8	12	4.8	.1	1.84	1.4	98.5	1.4	26.3	21.3	9.4	2.0	39.5	513
7.4385	−12	−2	3.7	.1	1.72	5.8	94.1	5.8	26.0	19.7	8.7	2.4	37.3	514
7.5651	8	33	4.9	.1	1.59	3.3	96.6	3.3	29.6	20.0	9.2	1.7	36.1	515
7.4593	−12	7	3.8	1.6	1.97	4.5	93.9	4.5	26.0	21.6	9.1	1.4	35.8	516
7.4876	− 8	10	4.5	.1	1.96	1.3	98.6	1.3	28.1	20.1	8.8	1.4	40.2	517
7.4043	−12	10	3.0	.1	1.62	1.4	98.5	1.4	33.2	20.8	9.7	1.3	33.5	519
7.5109	− 6	19	3.5	Tr.	1.36	.3	99.7	.3	32.1	22.5	9.7	.9	34.5	520
7.5001	− 7	11	3.9	Tr.	1.76	.6	99.4	.6	29.4	21.4	9.4	2.0	37.2	521
7.4568	−12	−2	3.0	.1	1.38	2.6	97.3	2.6	29.8	21.8	9.3	1.9	34.5	522
8.0233	71	101	496.0	1.1	3.75	.0	98.9	.0	7.1	21.2	8.5	2.0	60.1	524
7.5259	− 5	14	3.8	.1	1.55	.9	99.0	.9	31.2	21.3	9.2	1.2	36.1	525
7.5429	− 2	20	19.0	.1	1.93	2.0	97.9	2.0	26.1	22.5	9.2	1.5	38.6	

LOMPOC DISTRICT.

7.7567	−2	22	22.4	Tr.	3.10	0.0	100.0	0.0	19.0	20.8	8.6	1.0	50.6	343
7.8567	0	24	104.1	2.2	4.00	.0	97.8	.0	15.0	15.8	6.3	1.3	59.4	344
7.7401	−2	18	61.0	Tr.	3.55	.0	100.0	.0	17.0	18.6	7.6	.9	55.9	346
7.7845	−1	21	62.5	.7	3.55	.0	99.3	.0	17.0	18.4	7.5	1.1	55.3	

ARROYO GRANDE DISTRICT.

8.1066	100	156	807.0	0.2	1.16	0.0	99.8	0.0	0.0	28.4	10.5	0.5	60.4	347
8.1316	118	152	1,837.5	.1	1.06	.0	99.9	.0	.0	30.0	11.8	.2	57.9	348
8.1191	109	154	1,322.2	.2	1.11	.0	99.8	.0	.0	29.1	11.2	.4	59.1	

COMMERCIAL VALUES—Continued.

COALINGA DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B.t.u.*	*B.t.u.*
17	Oct. 31	Sec. 34, T. 19 S., R. 15 E..	California Oil Fields (Ltd.).	8	0.9300	20.54	10,346	18,623	144,298
25	Oct. 10	Sec. 28, T. 19 S., R. 15 E...	Hanford	7	.9440	18.31	10,464	18,835	148,137
	1909.								
395	July 1	Sec. 28, T. 19 S., R. 15 E...	Standard	68	.9352	19.70	10,241	18,434	143,632
398	...do	...do	...do	63	.9513	17.17	10,443	18,797	148,983
410	...do	Sec. 12, T. 20 S., R. 15 E...	Coalinga Mohawk.	1	.8899	27.32	10,587	19,057	141,294
	1910.								
612	Oct. 21	Sec. 12, T. 20 S., R. 14 E...	Shawmut	5	.9535	16.83	10,447	18,805	149,391
613	...do	Sec. 32, T. 19 S., R. 15 E...	Empire	1	.9442	18.27	10,431	18,776	147,705
614	...do	Sec. 1, T. 20 S., R. 14 E...	Zier	6	.9723	13.99	10,280	18,504	149,897
615	...do	Sec. 31, T. 19 S., R. 15 E...	Confidence	6	.9545	16.67	10,420	18,756	149,157
616	...do	...do	Commercial Petroleum.	12	.9372	19.38	10,324	18,583	145,103
617	...do	...do	Main State	5	.9584	16.08	10,407	18,733	149,583
618	...do	...do	Commercial Petroleum.	5	.9379	19.27	10,472	18,850	147,298
619	...do	Sec. 12, T. 20 S., R. 14 E...	Shawmut	4	.9760	13.44	10,188	18,338	149,117
620	...do	Sec. 1, T. 20 S., R. 14 E...	Zier	12	.9674	14.72	10,312	18,562	149,610
621	...do	Sec. 31, T. 19 S., R. 15 E...	KTO	3	.9432	18.43	10,392	18,706	146,999
622	...do	Sec. 12, T. 20 S., R. 14 E...	Shawmut	6	.9515	17.14	10,454	18,817	149,172
623	...do	Sec. 7, T. 20 S., R. 15 E...	Arica	6	.9535	16.83	10,460	18,828	149,573
624	...do	...do	...do	4	.9542	16.72	10,276	18,497	147,051
625	...do	...do	Coalinga Pacific.	1	.9526	16.97	10,387	18,697	148,392
626	...do	Sec. 8, T. 20 S., R. 15 E...	Security	1	.9645	15.15	10,407	18,733	150,535
627	...do	Sec. 18, T. 20 S., R. 15 E...	Nevada Petroleum.	1	.9575	16.21	10,421	18,758	149,642
628	...do	Sec. 8, T. 20 S., R. 15 E...	California Coalinga.	1	.9588	16.02	10,293	18,527	147,999
629	...do	Sec. 7, T. 20 S., R. 15 E...	Section Seven	4	.9500	17.37	10,203	18,365	145,359
630	...do	Sec. 25, T. 20 S., R. 14 E...	KTO	15	.9713	14.14	10,397	18,715	151,451
631	...do	...do	...do	35	.9624	15.47	10,348	18,626	149,349
632	...do	...do	...do	20	.9583	16.09	10,431	18,776	149,911
633	...do	...do	...do	25	.9584	16.08	10,454	18,817	150,254
634	...do	Sec. 6, T. 21 S., R. 15 E...	Pacific States Top Sand.	1	.8920	26.95	10,629	19,132	142,185
635	...do	Sec. 30, T. 20 S., R. 15 E...	American Petroleum.	8	.9678	14.66	10,337	18,607	150,034
636	...do	Sec. 6, T. 21 S., R. 15 E...	Silver Tip	1	.9225	21.76	10,546	18,983	145,901
637	...do	...do	...do	2	.8995	25.64	10,600	19,080	142,991
638	...do	Sec. 30, T. 20 S., R. 15 E...	Nevada Petroleum.	1	.9665	14.85	10,348	18,626	149,986
639	...do	Sec. 6, T. 21 S., R. 15 E...	De Lux	1	.9645	15.15	10,319	18,574	149,257
640	Oct. 22	Sec. 28, T. 19 S., R. 15 E...	Stockholders	5	.9222	21.81	10,348	18,626	143,111
641	...do	...do	Standard	46	.8990	25.73	10,449	18,808	140,874
642	...do	...do	...do	76	.9372	19.38	10,119	18,214	142,222
643	...do	...do	...do	60	.9225	21.76	7,158	12,884	99,025
644	...do	...do	...do	49	.9285	20.78	10,210	18,378	142,170
645	...do	...do	...do	77	.9515	17.14	10,461	18,830	149,275
646	...do	...do	...do	6	.9296	20.60	10,409	18,736	145,112
647	...do	Sec. 21, T. 19 S., R. 15 E...	California Oil Fields (Ltd.).	1	.9198	22.21	10,466	18,839	144,371
648	...do	Sec. 27, T. 19 S., R. 15 E...	...do	43	.9198	22.21	10,253	18,455	141,428
649	...do	...do	...do	25	.9158	22.87	10,303	18,545	141,500
650	...do	...do	...do	26	.9180	22.51	10,550	18,990	145,243
651	...do	...do	...do	53	.9240	21.52	10,382	18,688	143,868
652	...do	...do	...do	51	.9320	20.21	10,539	18,970	147,304
653	...do	Sec. 34, T. 19 S., R. 15 E...	...do	7	.9092	23.98	10,382	18,688	141,563
654	...do	Sec. 26, T. 19 S., R. 15 E...	...do	5	.9307	20.42	10,472	18,850	146,167
655	...do	Sec. 34, T. 19 S., R. 15 E...	...do	5	.9073	24.30	10,591	19,064	144,110
656	...do	Sec. 27, T. 19 S., R. 15 E...	...do	46	.9220	21.84	9,704	17,467	134,176
657	...do	Sec. 26, T. 19 S., R. 15 E...	...do	2	.9234	21.61	10,392	18,706	143,913
658	...do	Sec. 27, T. 19 S., R. 15 E...	...do	2	.9326	20.12	10,382	18,688	145,208
	1911.								
664	January.	Sec. 34, T. 19 S., R. 15 E...	...do	4	.9225	21.76	10,050	18,090	139,038
665	...do	Sec. 2, T. 20 S., R. 15 E...	W. K. Oil Co	4	.9280	20.86	9,809	17,656	136,511
666	...do	Sec. 34, T. 19 S., R. 15 E...	California Oil Fields (Ltd.).	16	.9288	20.73	10,448	18,806	145,528
667	...do	Sec. 2, T. 20 S., R. 15 E...	Turner Oil Co	1	.9292	20.67	10,406	18,731	145,010
		Average (56 samples).			.9385	19.26	10,310	18,558	145,107

COMMERCIAL VALUES—Continued.

COALINGA DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	*° C.*	*° C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
7.7484	50	72	12.3	Tr.	0.40	0.0	100.0	0.0	11.9	32.9	13.0	0.5	41.7	17
7.8650	75	96	30.0	Tr.	.45	.0	100.0	.0	4.2	41.0	15.4	.4	39.0	25
7.7917	56	80	18.3	Tr.	.39	.0	100.0	.0	10.1	35.5	13.3	.7	40.4	395
7.9259	100	121	56.9	Tr.	.49	.0	100.0	.0	2.4	39.8	14.8	.2	42.8	398
7.4143	55	74	5.8	Tr.	.29	.0	100.0	.0	19.4	36.7	14.3	.8	28.8	410
7.9442	89	119	58.8	0.5	.35	.0	99.5	.0	.4	38.2	14.4	.6	45.9	612
7.8667	93	115	34.1	Tr.	.50	.0	100.0	.0	.7	43.6	15.4	.3	40.0	613
8.1008	125	147	469.5	Tr.	.67	.0	100.0	.0	.....	36.9	15.4	.2	47.5	614
7.9525	97	118	69.1	Tr.	.53	.0	100.0	.0	.4	36.8	13.8	.3	48.7	615
7.8084	74	95	19.6	.2	.45	.0	99.8	.0	1.7	42.6	15.1	.5	39.9	616
7.9850	102	123	93.6	.2	.57	.0	99.8	.0	.1	38.3	15.2	.7	45.5	617
7.8142	73	94	20.3	Tr.	.47	.0	100.0	.0	1.5	42.5	14.9	.4	40.7	618
8.1316	130	152	730.5	.5	.64	.0	99.5	.0	.....	32.4	14.1	.4	52.6	619
8.0600	120	142	263.7	Tr.	.67	.0	100.0	.0	.....	39.4	16.2	.4	44.0	620
7.8584	67	88	26.5	Tr.	.55	.0	100.0	.0	6.8	35.3	12.8	.7	44.4	621
7.9275	85	110	58.1	.3	.45	.0	99.7	.0	.5	43.1	15.3	.3	40.5	622
7.9442	95	125	63.4	Tr.	.50	.0	100.0	.0	.2	40.4	14.4	.2	44.8	623
7.9500	110	127	61.0	2.5	.50	.0	97.5	.0	.7	40.4	14.0	.5	41.9	624
7.9367	94	111	56.8	.5	.55	.0	99.5	.0	.6	43.4	15.5	.5	39.5	625
8.0358	110	138	118.6	1.0	.59	.0	99.0	.0	.....	35.5	14.3	.2	49.0	626
7.9775	102	132	94.9	Tr.	.54	.0	100.0	.0	.....	36.1	13.2	.3	50.4	627
7.9883	108	126	97.5	2.2	.58	.0	97.8	.0	1.2	37.1	14.2	.1	45.2	628
7.9150	84	105	39.5	Tr.	.52	.0	100.0	.0	.6	44.3	16.1	.5	38.5	629
8.0925	125	150	531.9	Tr.	.65	.0	100.0	.0	.1	33.2	14.0	.1	52.6	630
8.0183	116	150	162.6	.8	.64	.0	99.2	.0	.4	37.5	14.5	.7	46.1	631
7.9842	90	112	108.8	Tr.	.63	.0	100.0	.0	.8	37.2	14.0	.3	47.7	632
7.9850	95	116	97.6	Tr.	.65	.0	100.0	.0	.7	39.3	15.3	.4	44.3	633
7.4318	−2	18	2.7	Tr.	.44	.0	100.0	.0	25.1	36.5	13.9	.7	23.8	634
8.0633	120	155	271.8	.7	.71	.0	99.3	.0	.4	38.3	14.9	.5	45.2	635
7.6859	18	40	9.7	Tr.	.43	.0	100.0	.0	11.1	33.4	12.9	1.0	41.6	636
7.4943	16	34	3.1	Tr.	.47	.0	100.0	.0	23.0	33.6	12.5	.9	30.0	637
8.0525	124	145	294.5	.3	.64	.0	99.7	.0	.....	30.9	12.9	.3	55.6	638
8.0358	105	131	222.1	1.5	.62	.0	98.5	.0	.....	29.7	12.7	.5	55.6	639
7.6834	46	66	7.5	Tr.	.36	.0	100.0	.0	13.7	40.7	15.1	.6	29.9	640
7.4901	8	31	3.0	Tr.	.28	.0	100.0	.0	23.2	34.5	13.4	1.1	27.8	641
7.8084	38	61	26.5	Tr.	.47	.0	100.0	.0	8.0	35.9	14.1	1.0	41.0	642
7.6859	80	120	63.4	8.7	.43	.0	91.3	.0	2.7	36.5	13.4	.5	38.2	643
7.7359	36	58	11.2	Tr.	.43	.0	100.0	.0	11.1	39.5	15.2	.8	33.4	644
7.9275	100	128	56.4	Tr.	.49	.0	100.0	.0	.6	41.7	15.2	.3	42.2	645
7.7451	46	69	12.6	Tr.	.43	.0	100.0	.0	12.8	35.9	13.6	.5	37.2	646
7.6634	38	60	6.1	Tr.	.34	.0	100.0	.0	21.1	35.2	13.5	.8	29.4	647
7.6634	38	58	5.9	Tr.	.34	.0	100.0	.0	15.6	39.9	15.2	.5	28.8	648
7.6301	5	26	5.3	Tr.	.45	.0	100.0	.0	17.4	34.8	13.9	1.2	32.7	649
7.6484	30	50	5.7	None.	.35	.0	100.0	.0	14.2	40.6	15.1	.7	29.4	650
7.6984	41	63	7.6	Tr.	.39	.0	100.0	.0	14.0	35.8	13.6	.6	36.0	651
7.7651	75	102	13.3	Tr.	.43	.0	100.0	.0	7.7	38.5	14.3	.3	39.2	652
7.5751	20	43	5.5	Tr.	.34	.0	100.0	.0	16.7	32.4	13.1	.9	36.9	653
7.7542	64	85	11.3	Tr.	.43	.0	100.0	.0	10.3	38.4	14.4	.2	36.7	654
7.5593	21	41	4.7	Tr.	.41	.0	100.0	.0	14.6	34.1	13.0	.6	37.7	655
7.6817	40	62	6.7	Tr.	.57	.0	100.0	.0	20.8	33.8	12.5	.4	32.5	656
7.6934	44	67	7.4	Tr.	.32	.0	100.0	.0	12.9	39.9	14.5	.8	31.9	657
7.7701	50	72	14.0	Tr.	.47	.0	100.0	.0	15.1	35.2	13.4	.5	35.8	658
7.6859	24	46	9.1	Tr.	.50	.0	100.0	.0	14.7	35.3	13.9	.9	35.2	664
7.7317	61	82	10.1	Tr.	.40	.0	100.0	.0	11.5	33.1	13.1	.4	41.9	665
7.7384	60	81	10.3	Tr.	.44	.0	100.0	.0	11.1	34.8	13.7	.5	39.9	666
7.7417	64	85	12.0	Tr.	.47	.0	100.0	.0	11.0	34.6	13.4	.2	40.8	667
7.8190	70	93	80.7	.4	.48	.0	99.6	.0	7.6	37.2	14.2	.5	40.1	

COMMERCIAL VALUES—Continued.

MIDWAY DISTRICT.

Laboratory No.	Date of sampling.	Location.	Lease.	Well No.	Specific gravity at 15° C.	Degrees Baumé at 60° F.	Heating value.		
							Per gram.	Per pound.	Per gallon.
	1907.						*Cal.*	*B.t.u.*	*B.t.u.*
106	Oct. 21	Sec. 26, T. 32 S., R. 23 E....	Mascot.....	4	0.9654	15.02	.....	.....	.....
	1910.								
586	Oct. 18	Sec. 31, T. 31 S., R. 23 E....	Hawaiian.....	1	.9160	22.84	10,554	18,997	144,979
587	...do....	Sec. 26, T. 31 S., R. 22 E....	Manchuria Midway.	1	.9940	10.85	9,569	17,224	142,642
588	...do....	Sec. 23, T. 31 S., R. 22 E....	Dome.....	1	.9535	16.83	10,354	18,637	148,056
589	...do....	Sec. 12, T. 31 S., R. 22 E..	American Oil Fields (Ltd.).	1	.9550	16.60	10,411	18,740	149,109
590	...do....	Sec. 31, T. 31 S., R. 23 E....	Hawaiian.....	2	.9410	18.78	10,483	18,869	147,933
591	...do....	Sec. 14, T. 31 S., R. 22 E....	Bear Creek.....	3	.9740	13.74	10,152	18,274	148,294
593	...do....	Sec. 25, T. 31 S., R. 22 E....	CCM(Santa Fe)	1	.9300	20.54	10,504	18,907	146,499
594	...do....	Sec. 6, T. 32 S., R. 23 E.....	United Oil.....	2	.9125	23.42	10,524	18,943	144,016
598	...do....	Sec. 36, T. 31 S., R. 22 E...	American Oil Fields (Ltd.).	79	.9220	21.84	10,481	18,866	144,923
600	Oct. 19	Sec. 4, T. 32 S., R. 23 E.....	La Bell.....	1	.8915	27.04	10,561	19,010	141,199
601	...do....	Sec. 32, T. 31 S., R. 23 E....	California Midway.	1	.9050	24.70	10,564	19,015	143,375
602	...do....	Sec. 23, T. 31 S., R. 22 E....	Rock.....	2	.9295	20.62	10,468	18,842	145,916
603	Oct. 18	Sec. 1, T. 12 N., R. 24 W....	Lakeview No. 1.	1	.9285	20.78	10,394	18,709	144,731
604	...do....	Sec. 25, T. 11 N., R. 23 W...	Western minerals.	8	.8835	28.46	10,696	19,253	141,721
605	...do....	Sec. 35, T. 11 N., R. 23 W...	.....do.....	11	.9165	22.76	10,579	19,042	145,403
		Average (16 samples).	.....	.....	.9324	20.30	10,420	18,755	145,253

SUNSET DISTRICT.

	1909.								
449	July 13	Sec. 1, T. 11 N., R. 24 W....	Monte Cristo...	12	0.9451	18.13	10,375	18,675	147,051
451	...do....	Sec. 35, T. 32 S., R. 23 E....	Webster.....	1	.9524	17.00	10,336	18,605	147,631
	1910.								
563	Oct. 16	Sec. 21, T. 11 N., R. 23 W..	Union.....	4	.9505	17.29	10,517	18,931	149,918
567	...do....	Sec. 32.....	Pacific Midway	1	.9349	19.75	10,406	18,731	145,900
568	...do....	Sec. 6, T. 11 N., R. 23 W....	Maricopa National.	1	.9211	21.99	10,444	18,799	144,267
569	Oct. 17	Sec. 1, T. 11 N., R. 24 W....	KTO.....	25	.9398	18.97	10,412	18,742	146,750
570	...do....	.....do.....	.....do.....	27	.9430	18.46	10,380	18,684	146,795
571	...do....	.....do.....	.....do.....	1	.9553	16.55	10,332	18,598	148,025
572	...do....	.....do.....	Monte Cristo...	8	.9453	18.10	10,372	18,670	147,043
573	...do....	.....do.....	.....do.....	4	.9515	17.14	10,332	18,598	147,436
574	...do....	.....do.....	.....do.....	1	.9613	15.64	10,319	18,574	148,763
575	...do....	Sec. 2, T. 11 N., R. 24 W....	Ruby.....	8	.9644	15.17	10,281	18,506	148,696
576	...do....	.....do.....	.....do.....	10	.9700	14.33	10,273	18,491	149,439
577	...do....	Sec. 25, T. 12 N. R. 24 W...	Lakeview.....	1	.9285	20.78	10,420	18,756	145,095
578	...do....	Sec. 26, T. 12 N., R. 24 W...	Sunset Monarch	.....	.9540	16.75	10,190	18,342	145,788
579	Oct. 16	Sec. 26, T. 32 S., R. 23 E..	Nevada Midway.	1	.9690	14.48	10,340	18,612	150,260
580	Oct. 17	Sec. 30, T. 32 S., R. 23 E....	Standard.....	3	.9275	20.94	10,453	18,815	145,395
581	...do....	.....do.....	.....do.....	4	.9500	17.37	10,290	18,522	146,602
582	...do....	.....do.....	.....do.....	8	.9480	17.68	10,436	18,785	148,371
583	...do....	Sec. 20, T. 32 S., R. 24 E....	.....do.....	1	.9105	23.76	10,530	18,954	143,783
584	Oct. 18	Sec. 15, T. 31 S., R. 22 E....	Globe Exploration Co.	1	.9750	13.59	10,269	18,484	150,151
592	...do....	Sec. 30, T. 31 S., R. 23 E....	Mays.....	1	.....	.....	10,554	18,997	.....
595	...do....	Sec. 6, T. 32 S., R. 23 E.....	United Oil.....	5	.9440	18.31	10,444	18,799	147,854
596	...do....	.....do.....	.....do.....	6	.9182	22.47	10,468	18,842	144,143
597	...do....	Sec. 31, T. 31 S., R. 23 E....	CCM(Santa Fe)	3	.9072	24.32	10,473	18,851	142,483
599	...do....	.....do.....	Mammoth.....	1	.8975	25.99	10,513	18,923	141,499
606	Oct. 19	Sec. 14, T. 32 S., R. 23 E....	Standard.....	2	.9091	24.00	10,438	18,788	142,306
607	...do....	.....do.....	.....do.....	1	.9294	20.63	10,464	18,835	145,847
608	...do....	Sec. 24, T. 32 S., R 23 E....	.....do.....	9	.9291	20.68	10,436	18,785	145,413
609	...do....	Sec. 26, T. 32 S., R. 23 E..	Nevada Midway.	2	.9712	14.15	10,307	18,553	150,123
610	...do....	.....do.....	North American Consolidated.	5	.9654	15.02	10,317	18,571	149,372
611	...do....	Sec. 23, T. 32 S., R. 23 E....	Babcock Petrol.	7	.9384	19.19	10,434	18,781	146,837
		Average (31 samples).	.....	.....	.9421	18.67	10,392	18,706	146,743

COMMERCIAL VALUES—Continued.

MIDWAY DISTRICT.

Weight per gallon.	Flash point (open cup).	Burning point (open cup).	Viscosity at 20° C. (Engler scale).	Water.	Sulphur.	Naphtha (unrefined).	Fuel oil.	Gasoline (refined).	Lamp oil (refined).	Lubricants (refined).	Refining losses.	Distilling losses.	Asphaltum (commercial).	Laboratory No.
Lbs.	*°C.*	*°C.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	91	137	223.3	Tr.	.....	0.0	100.0	0.0	5.3	34.6	13.1	0.4	46.6	106
7.6317	34	56	7.5	Tr.	0.53	.0	100.0	.0	19.8	33.7	13.0	.7	32.8	586
8.2816	135	187	.....	4.1	1.57	.0	95.9	.0	.0	23.2	11.0	1.9	59.8	587
7.9442	71	104	61.8	.1	.72	.0	99.9	.0	6.7	35.7	13.6	.3	43.6	588
7.9567	93	122	93.9	.1	.74	.0	99.9	.0	.0	41.7	14.5	.5	43.2	589
7.8400	60	88	27.7	.1	.67	.0	99.9	.0	12.7	35.3	13.7	.3	37.9	590
8.1150	120	156	884.6	4.3	1.06	.0	95.7	.0	.0	34.3	13.8	.8	46.8	591
7.7484	64	93	20.2	.1	.62	.0	99.9	.0	13.3	35.3	14.1	.4	36.8	593
7.6026	10	35	5.0	Tr.	.58	.0	100.0	.0	25.1	30.3	12.3	.4	31.9	594
7.6817	17	42	7.1	Tr.	.60	.0	100.0	.0	22.5	32.1	12.5	.9	32.0	598
7.4276	0	24	2.8	Tr.	.46	.0	100.0	.0	28.2	30.5	11.8	1.2	28.3	600
7.5401	15	39	4.5	Tr.	.51	.0	100.0	.0	25.2	31.0	12.7	.9	30.2	601
7.7442	40	63	12.4	Tr.	.61	.0	100.0	.0	17.8	33.4	13.3	.8	34.7	602
7.7359	36	63	19.2	.3	.85	.0	99.7	.0	15.2	31.1	12.5	.4	40.5	603
7.3610	15	34	1.7	Tr.	.16	.0	100.0	.0	37.8	34.6	13.4	.5	13.7	604
7.6359	59	82	3.4	Tr.	.25	.0	100.0	.0	25.5	39.6	15.5	.5	18.9	605
7.7498	54	83	91.7	.6	.66	.0	99.4	.0	15.9	33.5	13.2	.7	36.1	

SUNSET DISTRICT.

7.8742	31	70	42.6	Tr.	0.79	0.0	100.0	0.0	14.5	26.6	10.8	0.9	47.2	449
7.9350	32	77	73.6	0.2	.90	.0	99.8	.0	12.6	27.4	11.2	1.4	47.2	451
7.9192	117	142	28.1	.1	.24	.0	99.9	.0	.0	58.6	19.2	.3	21.8	563
7.7892	24	58	17.8	None.	.74	.0	100.0	.0	17.2	28.8	11.0	.4	42.6	567
7.6742	9	40	7.5	None.	.62	.1	99.9	.1	21.9	28.4	10.9	.5	38.2	568
7.8300	24	56	24.0	.2	.68	.2	99.6	.2	15.9	27.0	10.9	.7	45.1	569
7.8567	29	67	36.3	.4	.89	.2	99.4	.2	15.1	26.8	11.0	1.3	45.2	570
7.9592	55	97	103.9	Tr.	.94	.0	100.0	.0	10.3	27.5	11.0	1.9	49.3	571
7.8759	28	70	41.6	.1	.88	.0	99.9	.0	14.4	27.6	11.3	1.1	45.5	572
7.9275	38	77	63.0	.4	1.02	.0	99.6	.0	12.7	26.3	10.6	1.0	49.0	573
8.0092	66	105	173.7	.1	.92	.0	99.9	.0	9.9	27.8	11.2	.9	50.1	574
8.0350	75	115	261.9	.4	.88	.0	99.6	.0	8.9	27.4	10.8	.7	51.8	575
8.0817	84	129	543.5	.6	1.10	.0	99.4	.0	7.7	26.5	11.1	.9	53.2	576
7.7359	33	58	17.9	.1	.85	.0	99.9	.0	17.5	28.8	11.6	.6	41.4	577
7.9483	59	85	79.8	1.4	.99	.0	98.6	.0	10.9	30.4	11.8	.7	44.8	578
8.0733	114	142	440.1	.1	.86	.0	99.9	.0	.0	38.1	13.9	.4	47.5	579
7.7276	29	54	13.6	Tr.	.82	.0	100.0	.0	21.0	26.5	11.4	.8	40.3	580
7.9150	57	87	76.8	.8	1.05	.0	99.2	.0	10.5	32.9	12.2	1.1	42.5	581
7.8984	72	103	49.7	.2	.61	.0	99.8	.0	9.3	34.1	12.9	.6	42.9	582
7.5859	10	38	5.2	Tr.	.54	.0	100.0	.0	26.6	29.3	12.0	.8	31.3	583
8.1233	126	152	943.7	.3	.97	.0	99.7	.0	.6	32.8	12.9	.6	52.8	584
.....	20	35	5.2	Tr.	.49	.0	100.0	.0	23.3	30.5	11.7	.5	34.0	592
7.8650	55	76	34.4	Tr.	.69	.0	100.0	.0	11.0	33.0	12.5	.6	42.9	595
7.6501	5	25	5.9	Tr.	.58	.0	100.0	.0	22.7	31.1	12.0	.7	33.5	596
7.5584	0	18	4.1	Tr.	.57	.0	100.0	.0	24.6	27.1	11.0	.7	36.6	597
7.4776	10	11	3.0	Tr.	.53	.0	100.0	.0	28.4	27.1	11.0	.3	33.2	599
7.5743	18	50	5.1	1.1	.55	2.5	96.4	2.5	25.6	26.7	10.9	2.3	30.9	606
7.7434	25	76	10.4	9.5	.63	5.6	84.9	5.6	16.5	25.8	10.0	1.5	31.1	607
7.7409	28	61	11.0	Tr.	.62	.0	100.0	.0	24.6	27.7	11.0	2.1	34.6	608
8.0916	112	149	493.8	Tr.	.86	.0	100.0	.0	3.6	36.3	13.6	.4	46.1	609
8.0433	91	127	220.4	.4	.84	.0	99.6	.0	7.2	34.5	13.2	.5	44.2	610
7.8184	42	71	18.5	Tr.	.65	.1	99.9	.1	23.1	29.9	12.0	1.1	33.8	611
7.8496	47	79	120.5	.5	.76	.3	99.2	.3	14.6	30.3	11.8	.9	41.6	

PUBLICATIONS ON PETROLEUM TECHNOLOGY.

The following Bureau of Mines publications may be obtained free by applying to the Director, Bureau of Mines, Washington, D. C.:

BULLETIN 19. Physical and chemical properties of the petroleums of the San Joaquin Valley, Cal., by I. C. Allen and W. A. Jacobs, with a chapter on analyses of natural gas from the southern California oil fields, by G. A. Burrell. 1911. 60 pp., 2 pls., 10 figs.

TECHNICAL PAPER 3. Specifications for the purchase of fuel oil for the Government, with directions for sampling oil and natural gas, by I. C. Allen. 1911. 13 pp.

TECHNICAL PAPER 10. Liquefied products of natural gas; their properties and uses, by I. C. Allen and G. A. Burrell. 1912. 23 pp.

TECHNICAL PAPER 25. Methods for the determination of water in petroleum and its products, by I. C. Allen and W. A. Jacobs. 1912. 13 pp., 2 figs.

TECHNICAL PAPER 26. Methods of determining the sulphur content of fuels, especially petroleum products, by I. C. Allen and I. W. Robertson. 1912. 13 pp., 1 fig.

TECHNICAL PAPER 32. The cementing process of excluding water from oil wells, as practiced in California, by Ralph Arnold and V. R. Garfias. 1913. 12 pp., 1 fig.

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